THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVI. No. 1952.] LONDON, OCTOBER 9, 1900. [52ND YEAR. PRICE 6d.

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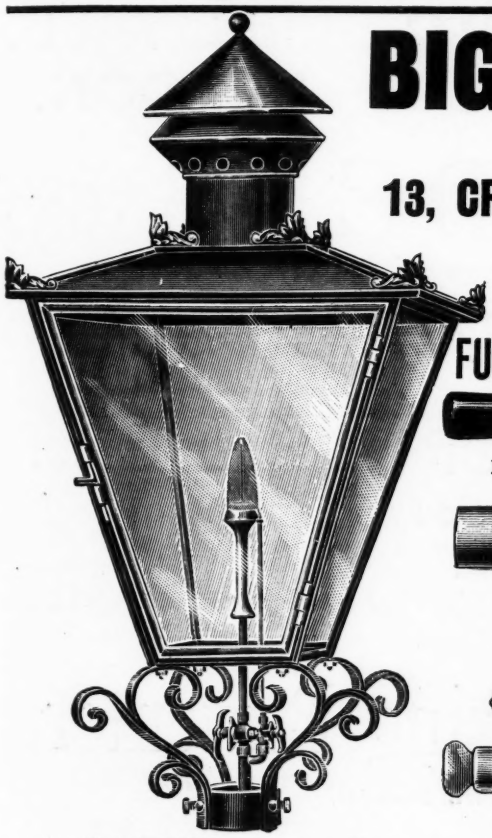
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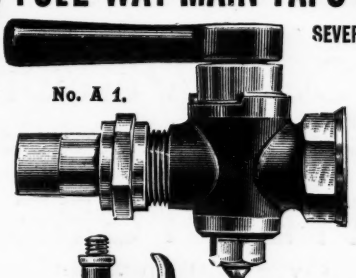
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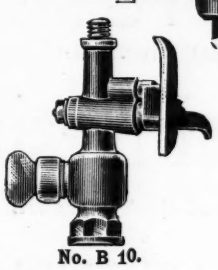
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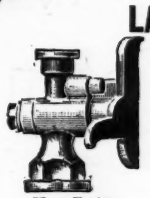
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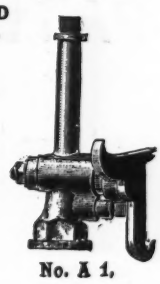
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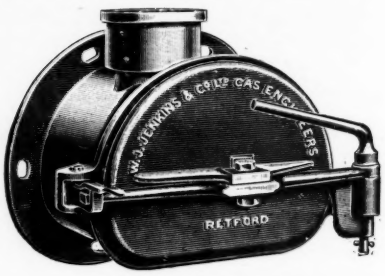

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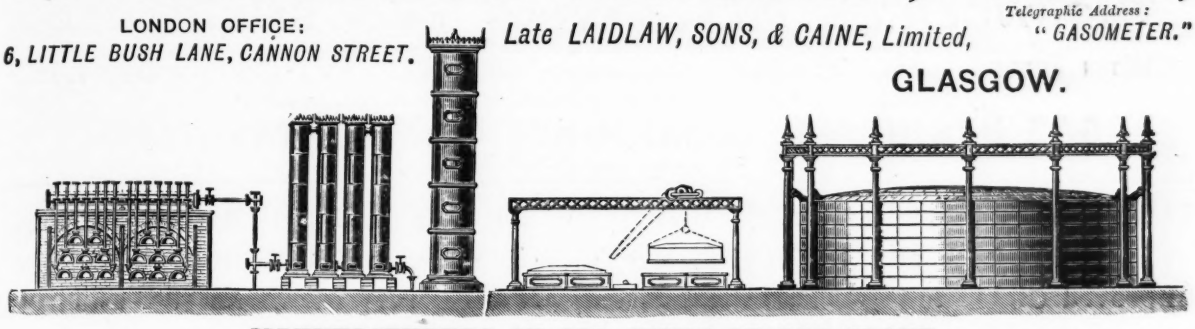

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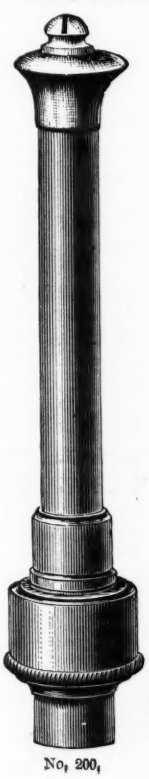

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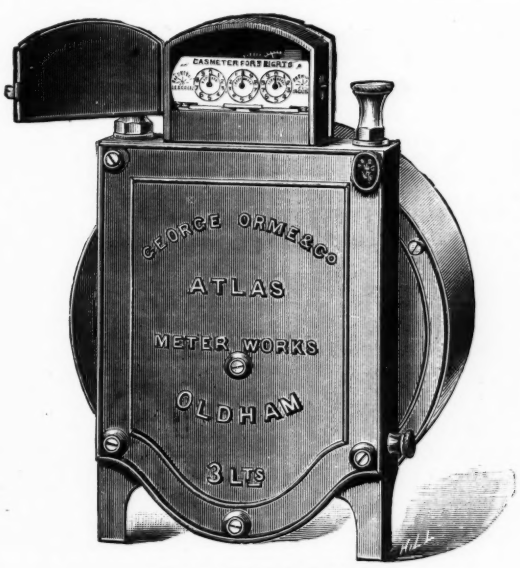

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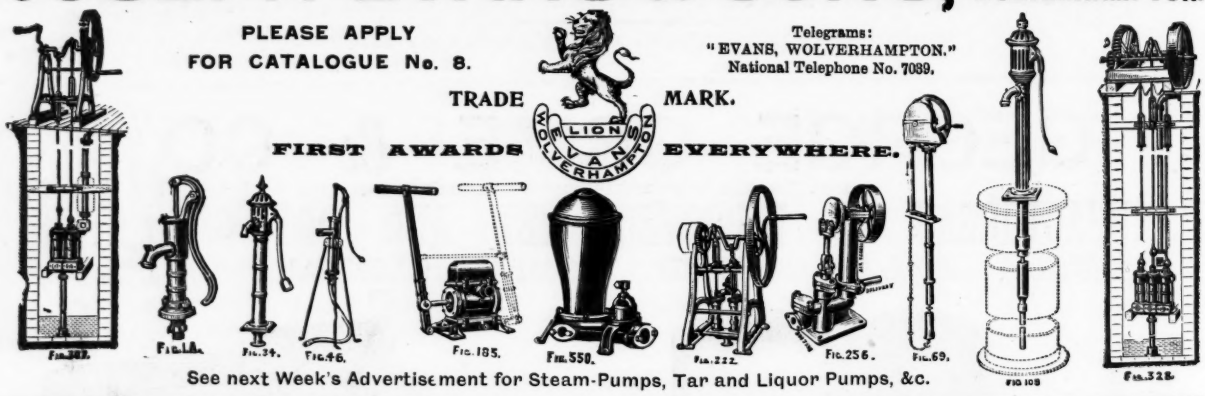

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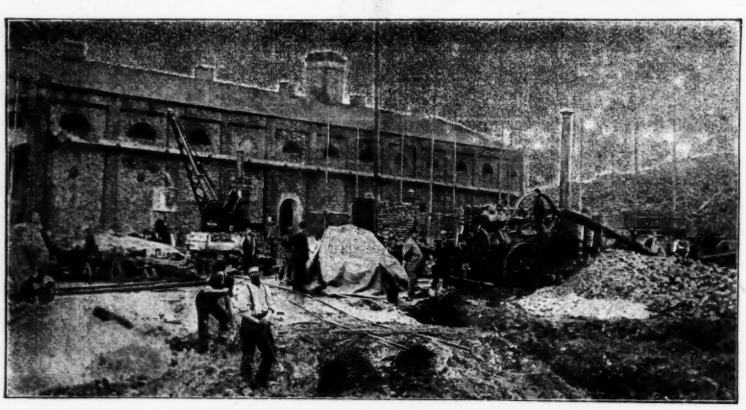

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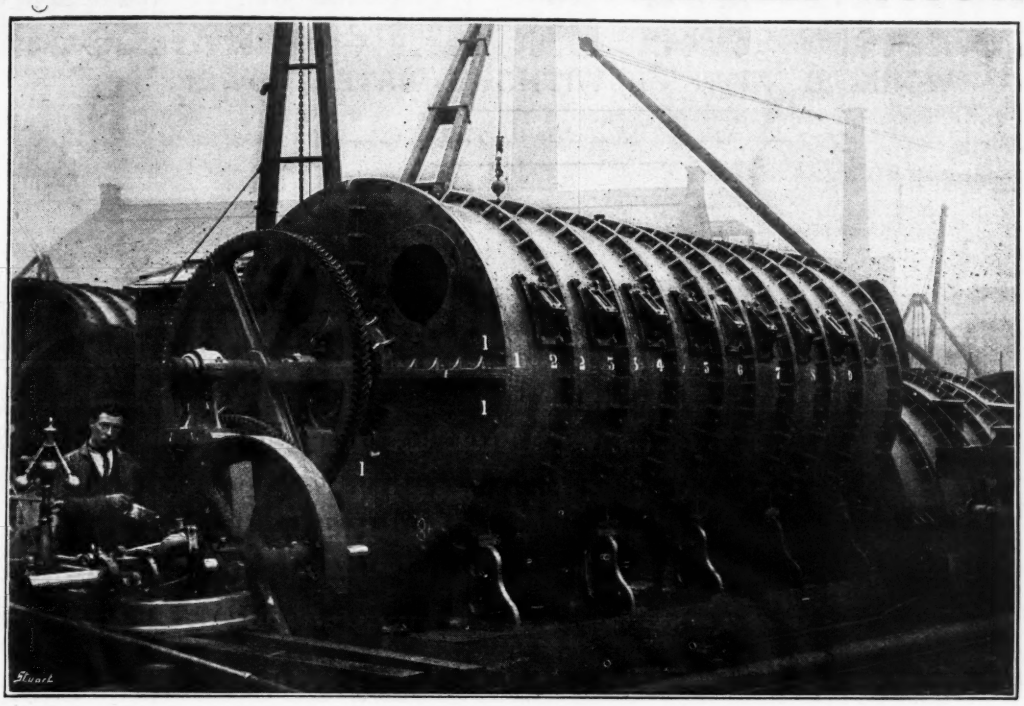

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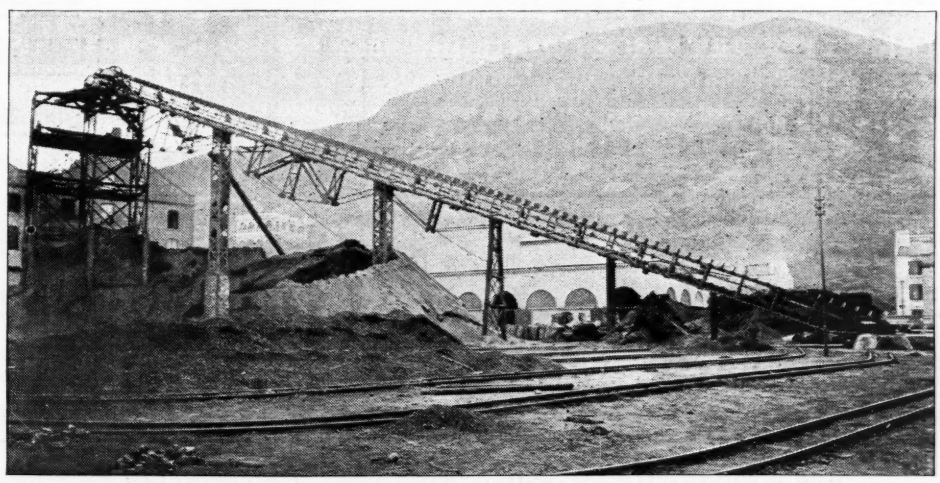

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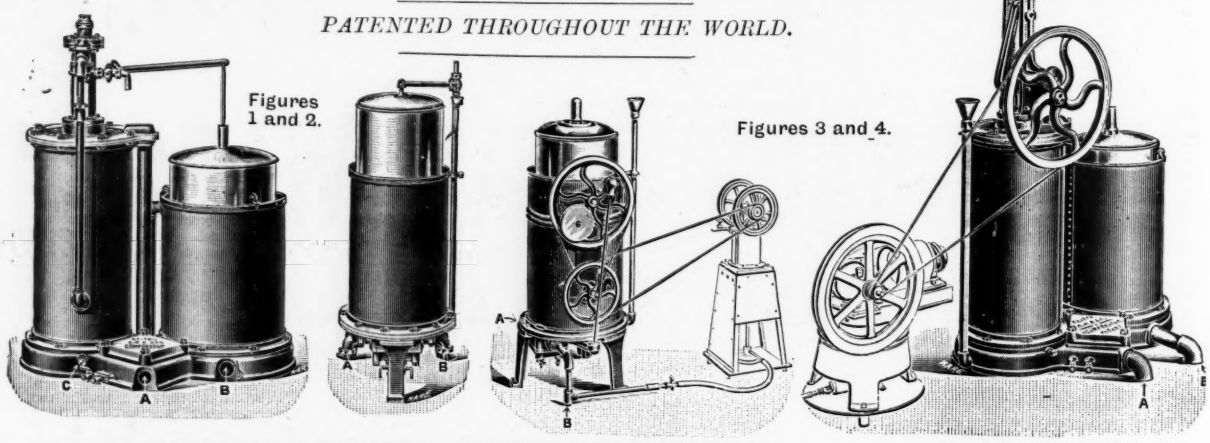

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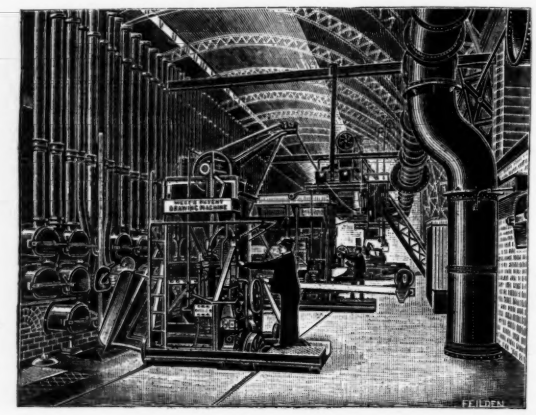

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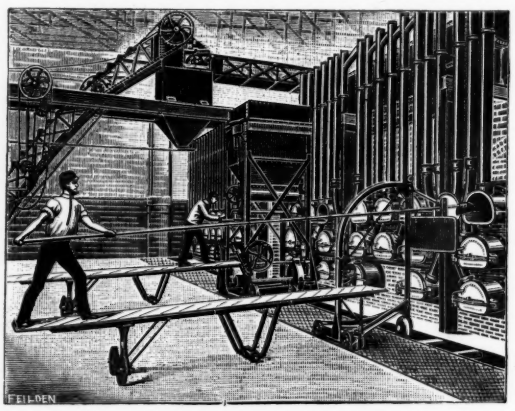

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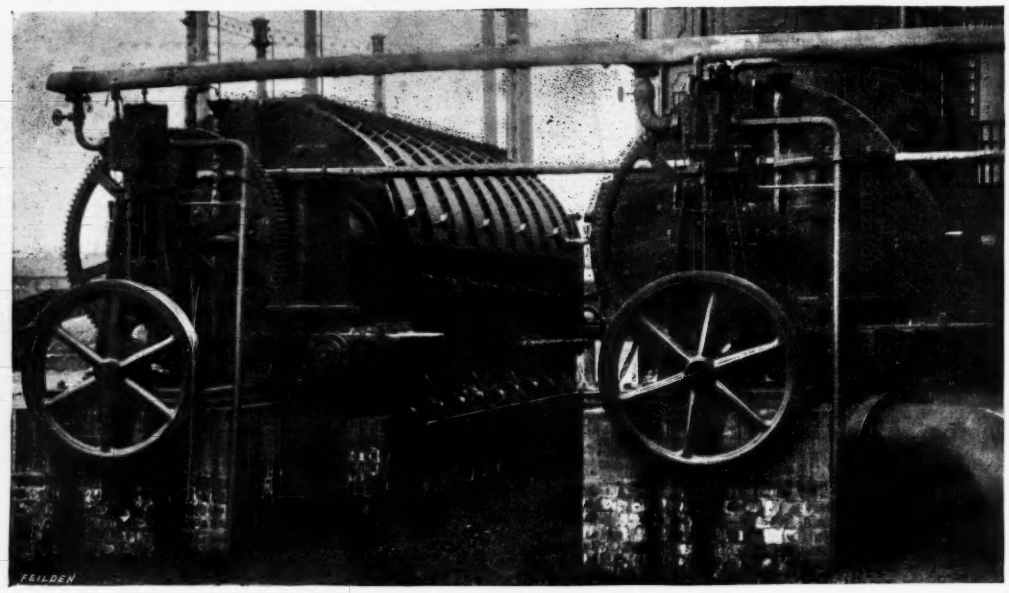

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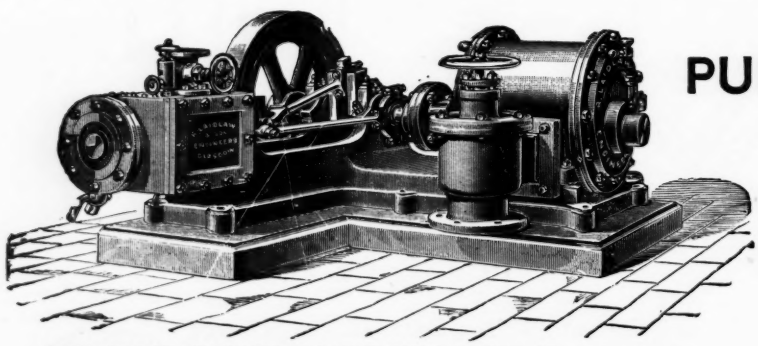

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Copenhagen	700,000	Coventry	600,000	Lawrence, Mass.	400,000
Copenhagen (2nd)	2,500,000	Coventry (2nd)	600,000	Commercial Gas Co.	850,000
Belfast	1,700,000	Bordentown, N.J.	125,000	Commercial (2nd)	850,000
Belfast (2nd)	4,500,000	Winchester	225,000	Commercial (3rd)	1,250,000
Brussels	750,000	Shanghai	225,000	Rotterdam	850,000
Brussels (2nd)	750,000	Stockport	600,000	Dorking	150,000
Liverpool	3,500,000	Norwich	1,000,000	McKeesport, Pa.	500,000
Liverpool (2nd)	4,500,000	Holyoke, Mass.	600,000	G.L.&C.Co., Bromley	3,750,000
Tottenham	750,000	St. Joseph, Mo.	750,000	G.L.&C.Co., Nine Elms.	2,750,000
Tottenham (2nd)	750,000	Lea Bridge	350,000	Durham	200,000
Santiago de Cuba	400,000	Lea Bridge (2nd)	350,000	New York	4,000,000
Swansea	750,000	Stockton-on-Tees	500,000	Scarborough	800,000
Manchester	3,500,000	Edinburgh	2,000,000	Perth, W.A.	125,000
Brighton	1,750,000	Guildford	350,000	Bremen	550,000
Preston	1,400,000	Brentford	1,200,000	Maidenhead	225,000
New York	1,200,000	Syracuse, N.Y.	850,000	Epsom	225,000
Southport	750,000	Bridlington	150,000	North Middlesex.	150,000
Bath	1,000,000	Middlesbrough	1,250,000	Wandsworth.	1,800,000
Newburg, N.Y.	350,000	Croydon	1,250,000	Aarhus	800,000
Newburg (2nd)	250,000	L. & N.W. Ry., Crewe	700,000	Falmouth	150,000
Hoylake	125,000	Taunton.	225,000	Southampton	800,000

SINCE JANUARY 1ST, 1899.

Hartlepool	750,000	Stockport (2nd)	600,000	Faversham	200,000
Utrecht	1,000,000	Croydon (2nd)	625,000	Birmingham (Swan V'ge)	1,500,000
Deventer	150,000	Maidenhead (2nd)	225,000	St. Gallen (Switz.)	225,000
Portsmouth	1,000,000	G.L.&C.Co., Beckton	2,250,000	Colney Hatch	400,000
Bournemouth	1,000,000	G.L.&C.Co., Fulham	1,750,000	Southampton (2nd)	500,000
Aylesbury	150,000	Tottenham (3rd)	350,000	Tunbridge Wells	1,000,000
Hamburg	1,750,000	Sydney (Harbour)	500,000	Hebden Bridge	200,000
Redhill	275,000	Sydney (Mortlake)	500,000	Chorley	300,000
Dublin	2,000,000	Manchester (2nd)	3,500,000	Liège	1,000,000
Posen	450,000	Hull	1,500,000	Stafford	500,000
Dunedin (N.Z.)	150,000	Longton.	600,000	Bridlington (2nd)	200,000
Lincoln	500,000	Staines	600,000	Gosport	200,000
Antwerp	1,500,000	Commercial (4th)	2,000,000	G.L.&C.C., Beckton (2nd)	10,750,000
Brussels.	1,000,000	Dublin (2nd).	2,000,000	Tottenham (4th).	1,000,000
Brighton (2nd)	1,850,000				

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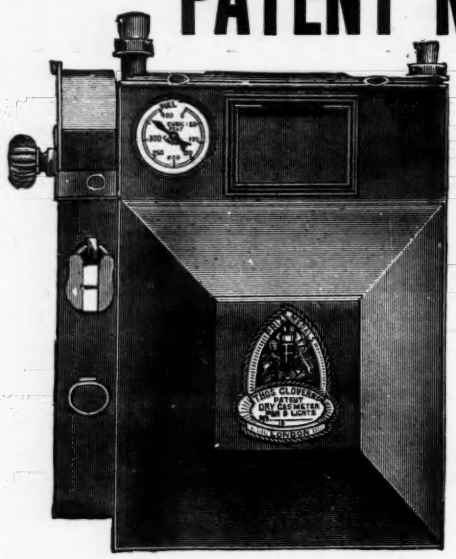

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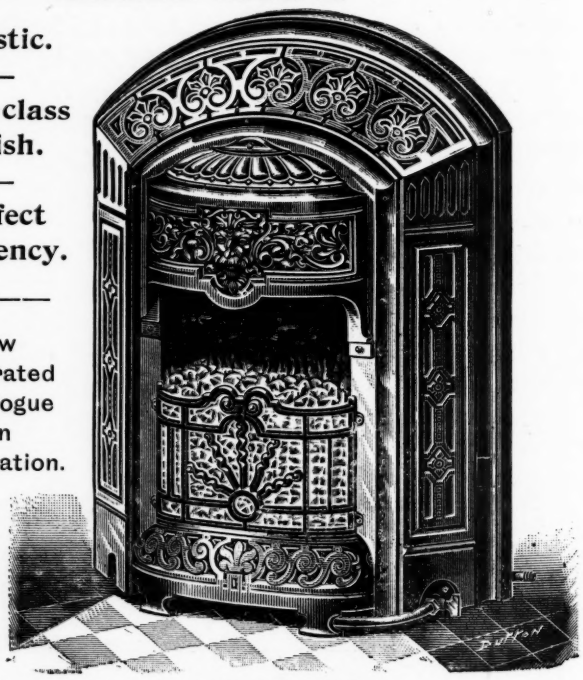

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

Need of Cheap Machinery.

A WRITER in a recent number of the "Spectator"—commenting on the triumphs of mechanical science which crowd the buildings at the Paris Exhibition—took occasion to call attention to the costliness of almost every machine, and the causes of that dearness, and to ask whether such high cost is really inevitable. The fact that the purchase of machinery involves the expenditure of large sums of money will certainly not be disputed by gas engineers; they are only too painfully aware of its truth. But before it is possible to say that anything is dear, it is necessary to prove that something that will do as much of the work required to be done, and do it as well, can be (or, were it made, could be) obtained for less money. That point is clearly seen by the writer of the article to which we have referred; and his contention is that our machinery need not cost so much as it does if only manufacturers would be content to make machines less perfect in finish—not the best which can be turned out, but equally good for their purpose. Add to this the hindrance to cheap manufacture afforded by the Trade Union rules restricting the number of hours during which a man may work a "tool"—that is, a machine-making machine—and that limit his output, and we find altogether "a considerable body of "opposition to one of the great and pressing needs of the "day." The fact that mechanics are paid high wages is urged at times as a reason why the machinery they produce is dear; but, as the "Spectator's" contributor points out, that argument will not hold water, as workmen get just as good pay in other industries, and yet produce cheap goods. The Oldham cotton spinners are among the most flourishing of workpeople (who has not heard of the Oldham Wakes?); but the article they manufacture is so cheap that it has been found to pay better to import Lancashire cotton goods into Central Africa, where cotton is indigenous and labour to be had for next to nothing, than to make the goods on the spot.

There is, indeed, no necessity to go outside the machine-making industry in order to prove that high wages do not of necessity mean dear goods; for we need only look to the United States to find mechanics' earnings higher and machines cheaper than they are in this country. The writer in the "Spectator" appears, in fact, to have left the Americans out of his reckoning, as he makes no mention of their products in the machine-making field, where he might, in truth, have found ample evidence to prove that most kinds of machinery (agricultural labour-saving appliances especially) can be turned out at much less cost than that for which they are produced over here, if only the men work their tools loyally, and the masters and purchasers are content with a serviceable, but less highly finished, article. Our readers may remember a remark made by an American, which we have before quoted, that English locomotives are fit to hang on a lady's watch-chain, but for their size. The American engine, on the other hand, is less elegant, but equally useful, and cheaper. There lies the moral our manufacturers have to learn; and it will be sharply brought home to them ere long by the advent of keener competition.

Our cousins across the water were, in fact, the first to produce that pattern of a serviceable and accurate but cheap machine which is a standing refutation of the theory that such a machine cannot be produced. We refer to the Waterbury watch. "All the arguments by which manu-"facturers say you cannot, will not, and shall not have a "cheap self-binding reaper, or a cheap steam-digger, or a "fifty-guinea autocar, or engines for a launch, that shall "not cost more than if they were cast in silver, were used "against the men who said they could make cheap watches. "They knew better, organized their work, had cheap tools "to make their watch machinery, and very soon turned "out by the hundred thousand a most delicate machine, "adjusted to fractions of a second, cheap, fairly durable, "and good enough." What the English manufacturers do apparently (and their men undoubtedly) fail to see is that a material reduction in the cost of machinery would lead to its far wider use. If only the Trade Union would allow tools to be worked to their maximum output, there would be employment for more hands than ever, as the demand would be stimulated by the decreased cost. If agricultural machines only cost one-third or one-half of their present

price, they would be used throughout England; and the area of country under corn would increase rapidly—to the benefit of farmers in particular and the nation in general. If stoking machinery could only be installed in gas-works for 50 per cent. of the present outlay, how many works would be without it five years hence, how much cheaper could gas be produced, and how much more gas would be consumed!

There is, in truth, a rich harvest waiting for the men who will provide us with cheap machinery; and we are not without hope that the stimulus that will soon be given to the enterprise and ingenuity of the manufacturers in this country by the influx of the surplus production of American workshops, will eventually lead to the great revival of our national prosperity that must ensue from the cheapening of the means of production. At no time in recent years has the need of cheaper methods of manufacture been more keenly felt than at the present.

The Affairs of the Commercial Gas Company.

THE general meeting of the Commercial Gas Company on Thursday did not offer any promise of interest; and therefore it proved to be very well worth attending, for several reasons. It is always a particularly businesslike gathering, for one thing; for although the Chairman, Mr. John Blacket Gill, makes no pretence of being an expert in gas, he is very straight, and speaks to the point. Thus, on this occasion, in a few simple words he explained so clearly the necessity under which the Commercial Directors lay to increase the price of gas, that there was no more to be said either about this or the consequential reduction of the dividend. Even at the advanced price, the Company have not cleared their coal bill, nor earned the dividend declared. Not a word of protest was raised from the other side of the table against the diminished dividend; though, by a rare coincidence, it has followed upon the new departure of the Company in respect of selling new stock issues in the open market. This reticence is really a high compliment to the Commercial Board, especially when it is remembered that many of the proprietors who regularly attend the meetings follow the operations of the Company with keen interest. The Directors have received a deputation of consumers with reference to the advanced price of gas; but naturally nothing came of it. There is no denying the facts of the matter; and Mr. Gill is not the man to irritate his public by any defect of manner or want of tact in dealing with a delicate situation. Of course, it is hard that the Commercial Company, like most other gas companies, should have been compelled to raise the price of gas—just as the poor of their district are beginning to enjoy the benefits of gas and the Local Authorities are "progressing" into electric lighting; but it cannot be helped. Doubtless, if the Board could have paid heed to the case of the richer and older proprietary alone, they would have been inclined to cut the dividend down to the earnings. Having sold stock recently, however, they owed some consideration to the purchasers, and were also constrained to think of the future. Accordingly they dipped into the reserve fund.

Mr. Gill remarked that he feared the London County Council might be so ill-advised as to re-introduce next session their Portable Photometer Bill. This was the first warning of such a design that had reached us; and we lose no time in declaring that if the County Council are bent upon doing anything of the kind, it must be attributed to the sway of influences of the most mischievous order. It is all very well to cry up the public spirit of modern local authorities; but when this enterprise takes the form of squandering public money upon unnecessary, or even pernicious, adventures, it is time to put a check upon it. In his suggestive little speech in reply to a vote of thanks to the engineering staff, Mr. H. E. Jones mentioned the very heavy burden of rating that oppresses the East-end parishes. The authorities responsible for the administration of these districts seem, according to Mr. Jones, to spend the ratepayers' money more extravagantly than the Vestries of the rich West-end of the town. Although it seems paradoxical to say it, there will always be a greater tendency to extravagant expenditure out of the rates in a poor than there can be in a well-to-do local government area. This is a question for the London Municipal Boroughs of the future. The equalization of rates as between the differently circumstanced parishes of the Metropolitan area is a just measure, in a proper degree; but it should not be permitted to cover illicit or extravagant payments by the lower-class Vestries.

Lastly, for those who had eyes to see it, there was provided in the room where the Commercial meeting was held (one of the public apartments of the Cannon Street Hotel) an excellent object-lesson for the encouragement of gas shareholders. The room had originally been lit by means of an 8-branch gas-pendant, of a familiar type. In course of time, eight branches for incandescent electric lamps had been placed in the intervals of the gas-burners, and had shone in their stead. Now, and lastly, four of the old flat-flame gas burners and globes are replaced with Kern incandescent gas-burners, which thus do the work of the electric lamps, retired. The same substitution has been made throughout the Hotel. The traces of the alteration of the old fittings are quite a subject for study in what may be styled the archæology of domestic artificial lighting.

Official Photometry under the Gas Referees.

THE publication of the Notification of the Metropolitan Gas Referees for the winter is a fitting opportunity for calling attention in these columns to the present state of the practice of statutory gas testing, as regulated and ordered by this authority. In the first place, it is imperatively necessary that everybody who is required by law, or is otherwise moved, to follow the proceedings of the Gas Referees, should be provided with official copies of these Notifications as they appear; for there is no finality in the Referees' ordinances. For this reason, it is impossible to be certain, with regard to such independent statements relating to legal English photometry as that made by Dr. Violle at the recent International Electrical Congress in Paris, that the description applies to the absolutely latest pattern and method of using the Referees' apparatus. The previous Notification of the Referees, for the past summer, contained enough fresh matter to fill about a column of the "JOURNAL." The present prescription also contains new features. Once more Mr. Vernon Harcourt's Ten-Candle Pentane Lamp, the standard of light adopted by the Gas Referees, has been altered—or improved, if the word be preferred. The description and illustration of this standard in Appendix A are corrected to embrace the addition to the apparatus of "a metal cone, acting as a damper," suspended over the air-inlet. This device is arranged to be actuated by a string carried over pulleys to an adjusting screw fixed on the table, handy to the examiner's seat. Its object is the laudable one of enabling the operator to regulate the lamp without having to leave his chair. He is further considerately told that "it is best so to turn "the stopcock as to allow the flame to be definitely too "high, but not to turn it full on, before letting down the "regulating cone to its working position." Simple enough, doubtless; but still forming one more thing for the officer to look to. Dr. Violle reports that already the pentane standard required "more attention" than the Hefner-Alteneck standard lamp; while M. Liebenthal has reported that it takes half an hour after lighting up to attain its maximum brilliancy. The Notification only requires, as before, that the lamp is to be burnt at near its proper height for at least ten minutes before any testing is made.

The previous Notification contained a prescription relating to the provision and care of service-pipes to testing-places. This ordinance is repeated. It is probably the outcome of a polemic, or negotiation with the Gas Companies; and the nature of the directions given is one more bar to the acceptance of any system of peripatetic penalty testing. The whole tenour of these Notifications, of course, absolutely negatives the idea of the trustworthiness of any gas testings otherwise conducted. If a Portable Photometer Bill should again be promoted in Parliament, it should be sufficient answer to the preamble to call the Referees as witnesses, one after another, put a copy of the Notification to them, and then ask to have the superfluous directions pointed out. If any follower of the gas industry wishes to know what are the peculiar cares and responsibilities of the managers of London gas-works, the same source of information will serve for his enlightenment. The managers have to prepare to meet all this microscopic gas examination daily and hourly, and keep the sulphur down to the prescribed limit. Nowhere else in the world is anything approaching this rigorous examination practised. For this reason, the management of London gas-works is an art not to be acquired out of the Metropolis. What with the care of his purifiers on the one hand, and the

thought of his daily testing returns on the other, the London gas manager has so much to worry him that the wonder is how he can think of economies and improvements in working. Whatever he may ponder in the way of cheap gas making, the trial of fresh materials of manufacture, or what else, he has ever present to his mind the consciousness of the Referees sitting serenely aloft, in official detachment from all sympathy with, or necessary knowledge of, the gas maker's business—not to keep watch on the life of this "poor Jack," but to screw him up in a cast-iron regimen. And behind the Referees stands the functionaryism of the London County Council, ever ready to justify itself at all costs to private trade and enterprise. So the position is to-day. How rapidly and thoroughly would it be changed if the gas supply were municipalized!

North of England Association and Federation.

THE North of England Gas Association, at their meeting in Durham on Saturday, had before them a meagre programme of business; but before they rose, Mr. T. Bower, of West Hartlepool, filled up the blank by moving them to action upon the subject of labour troubles, which to many, both inside and outside the Association, is an all-important one at the present time. This is not the first occasion on which Mr. Bower has not only called attention to, but has been instrumental in getting something done upon, a master question. Just two years ago he intervened with a proposal for combined action in the matter of insurance of owners of gas-works against liability for accidents to workmen. The good which was effected by his step was great indeed—the Insurance Companies having come down to conditions which make it no longer necessary to combine in order to get suitable terms. The question Mr. Bower has now raised will not, it is to be feared, be so easy of solution; for the class to be dealt with is a much more unscrupulous one than are the trained financiers of the insurance world. At the present time, a general demand, supported by organizations which always figure in like movements, is being made for conditions of labour that are not in all cases equitable. In Mr. Bower's own instance, the money claim alone would result in adding £3000 a year to the expenditure of his Company. The proposal is to take common action in dealing with all such applications. It is not intended to go farther at present than to collect information with a view to the formulating of a scheme. That may or may not be a safe movement; but, whether or not, any further step will require to be well considered before it is taken. Hitherto the aim of the Workmen's Unions has been to force the hand of the owners of gas undertakings in the largest centres of population. In all these places they have been so far baffled that they have not yet obtained a footing inside the gates. As this is what the leaders (as distinct from the men) most desire, the present descent upon the smaller undertakings is not devoid of the suspicion that they may have arrived at the conclusion that it would be easier to compel recognition at the hands of the scattered representatives of the industry in the Provinces than at the hands of the powerful bodies in the larger cities. This is a point not to be lost sight of; because it would not be to the profit of the whole industry were the weaker places to be captured by the Workmen's Unions. Even the information collected, if it be not well guarded, may be used to defeat the purposes of the employers; and with this possibility in view, the Committee of the North of England Association will do well to ponder carefully the scope of their inquiry before they enter upon it. Our sympathies are always with those upon whom inequitable or tyrannical claims are being made; and we are in complete accord with Mr. Bower's motive in striving towards some common understanding upon a subject of common interest. But we should prefer to see much caution displayed, and deep counsel taken, before it should be resolved to form the employers of labour into a militant organization which could be cited, questioned, ridiculed, or placed in dock or pillory; because the creation of such a body might mean masters and men standing hopelessly at bay, and a demand for someone in authority to step in and compose the differences. Could there be a more complete triumph for the leaders of the workmen? A friendly conference with workmen is always an open course, and commits no one to more than may be agreed upon. To admit workmen to a formal Court of Conciliation, with their representatives present, would be a risky step. We fear that Mr. Bower's generous feelings towards the workmen, which do him inexpressible credit, although in the one case it might be appreciated, would, in the other, be altogether thrown away.

Borneo Gas Oil in the Thames—and in the Newspapers.

THE great Crummles could never understand how all the interesting little bits of information about his theatrical company got into the papers. It was an unfailing source of wonderment to his simple mind how the newspapers were able to tell their readers so many things about him and his little arrangements for entertaining the public. The case of Crummles must often recur to the minds of readers of the newspapers of the day, when they discover such frequent mention in print of certain persons and transactions. For some unknown reason, much journalistic notice is being taken of the development of the Borneo petroleum trade, which seems to be largely, if not exclusively, in the hands of a concern called the Shell Line Company. Last week, the news went the round of the London newspapers, and is doubtless still spreading, of the arrival in the Thames of a cargo of Borneo oil for the London market. This consignment was declared to be for the Gaslight and Coke and the Brighton Gas Companies; the quantity being 6000 tons, and the price 25 per cent. under the rates current for Russian gas oil. This is a big cargo; and the interest of its safe arrival was increased by the accompanying explanation that it had been carried the whole of the 10,000 miles of sea between Borneo and Millwall by oil-fuel steaming.

As is generally the case, the real points of importance in respect of this performance were carefully omitted from the newspaper reports; nor is the special account published in the "Petroleum Review" much more explicit. We want to know what are the true prospects of the importation of Borneo gas oil into this country. There is no miracle in the mere getting of a single cargo of oil, or coal for that matter, across seas; but if, as we remarked on the arrival of the American coal, one swallow does not make a summer, most assuredly one shipment does not constitute a trade. As time goes on, it becomes more and more evident that the petroleum supply of the world is both large in amount and widely scattered—in this respect resembling coal and peat deposits. Very many questions have to be considered before it can be settled which source of fuel supply is commercially and industrially most available. The problem of bringing Borneo oil to the British market, at a price to compare favourably with the American and Russian articles, is primarily a simple question of freights—assuming, that is, that all three supplies are of about equal industrial value. The American supply is in the hands of the Anglo-American Oil Company, whose business organization is unsurpassed. The industrial organization in the United States, which stands behind this distributing concern, is, and has long been, perfected. Hence no further developments of the American oil trade are to be looked for. At the same time, the combined interests vested in this enormous trade are so vast and well controlled, that every effort will, as a matter of course, be made to retain the markets of the world by selling at the lowest margin of profit. The case of Russian oil is not the same, inasmuch as the source of the supply is not yet in pipe-line connection with any ocean port. It is rumoured that the organization which is to be the counterpart in the Russian trade of the Anglo-American Oil Company is already constituted; though this seems putting the cart before the horse. But presumably the members of the new company know their own business. The complete commercial fruition of the Russian export oil trade must, however, await the completion of the inland transport arrangements; and meanwhile it appears premature to say how the product will stand in the market.

Wherefore, advertisement apart, it seems the prudent thing to hold this Borneo importation as an experimental success only. As at present advised, it would be rashness to admit the supply as a reliable one in the sense of being profitable to all parties. It is a far cry to Borneo. Nor does the expedient of steaming with oil fuel strike one as a proved success, to the degree of rendering that possible by this means which is not commercially practicable with coal fuel. One would like to see a complete balance-sheet of the steaming performance, covering a round trip with each kind of fuel. Nothing short of this proof is worth an instant's consideration. We all know the generalities as to one pound of oil being as good for fuel as two pounds

of coal, and the saving of stokers' labour with the former. The question of what the difference between the fuels amounts to in the long run, all in, has never been conclusively answered. In the example in point, we observe that the cost of the steam for atomizing the oil remains a bugbear of the system. A method of burning oil which is free from this drawback is evidently demanded. Not until this improvement is effected, will liquid fuel be strictly comparable, on the merits, with steam coal.

How Not to Read Gas-Meter Indices.

Last week, *à propos* of the smoke-prevention movement, we had occasion to remark on the slowness with which accurate knowledge of some things penetrates the educated orders of the community. Another example in point has come under our notice, in a well-meant endeavour of a writer in Saturday's "Daily News" to teach the public how to read a gas-meter index. One might have been pardoned for thinking that quite enough had been done in this branch of technical instruction; but evidently such a conclusion would be too sanguine. It is the positive fact that this latest of would-be teachers of an accomplishment seemingly rarer than ability to decipher Egyptian hieroglyphics, fails in half-a-column of type to disclose the key to the mystery of meter-dials, and actually misrepresents these common objects of the gas consumer's cellar! He gives a drawing, not over clear, of the meter-dials, which he boldly declares to be "the same as those which "appear on the face of every gas-meter—either in laundry, "factory, or private house," and proceeds to reflect on the astonishing circumstance that so few people can reckon their own gas bills. The joke of the affair is that his drawing is all wrong. He makes all the dials read in the same direction; having failed to observe that the middle dial reads in the opposite way to the first and third. Therefore he cannot be expected to have the sense of the business of index-taking aright, and consequently to be able to lay down the only rule which is to be followed—that of registering always the lower of the two figures between which the pointer stands, on every dial. This is very funny, in a voluntary teacher. No wonder, if such are the instructors, that the ordinary householder is at a loss to read his gas-meter. But this is not all; the same respectable authority states that "these little hands enable "the renter to tell to a sixpence what the bill should be." They do this, of course; but only if the registration at the previous indexing is known. A further explanation of this point is introduced by the cryptic statement: "As "a rule, a gas company never sends out a meter with "the hands at zero, just to confuse customers; but "that makes no trouble in computing the bill." It is very sad; but in these days of bicycle cyclometers, one might reasonably have credited gas consumers with knowing a little of the trick of continuous mechanical counters. It is hardly necessary to state that most gas companies do the index-taking of consumers' meters in some way that puts the consumer in complete possession of the same data as that used in making out his gas account. This is useful in enabling the inspector to check his entry on the spot, and satisfies the consumer who may happen to be curious in the matter. As a rule, the consumer thinks little about it until he receives his bill; and then he only cares to mark whether or not the amount is increased. We pity the consumer who valiantly tackles his meter-index under the guidance of the "Daily News" expert. He might succeed in taking the registration correctly the first time, although this is doubtful. When he went to look at it again, a week or so later, there would be "confusion worse "confounded" between the aspect of the dials and their newspaper presentment. If some Metropolitan householders give their district gas inspectors trouble a fortnight hence, the latter will know whom to thank.

The Artistic (?) Electrolier.

Referring to our last week's "Note" in these columns on the eccentricities of design exhibited by the lamp-posts of London town, it has since been brought to our notice that several firms of electric light fittings manufacturers have brought out pattern-books of "electroliers" for the coming lighting season. Some of these works of art are well spoken of in contemporary journals; and we have examined them with no small degree of curiosity. Result—disappointment. Yet it can hardly be called disappointment, either; because nothing better was to have been expected of tradesmen who continue to offer for sale the vile imitation electric "candle," which figures in all furnishing electricians' catalogues. An electrical contemporary has distinguished, by reproducing, one of these "artistic" electric light fixtures. It is a statuette of a very fat small boy, insufficiently clothed, but in violent action—bounding forward—with a sham candle stuck upon his chubby outstretched finger. What an idea! How much light might one of these imitation candles be expected to give? Certainly, not enough to go very far towards the lighting of a room of any size. And then, imagine the effect of a repetition of fat boys holding candles at an impossible angle, in every corner of the room. How reposeful! This element of suitability for repetition to any desired extent is, of course, one of the points of good lamp-standard designing; and it greatly increases the difficulty. The very handsomeness of articles that might be very acceptable as specimens—in standard oil-lamps, for example—debars them from being multiplied. Public opinion wants to be educated in this matter of lamp design; but the trouble is to find capable masters of the subject. It is not a trouble of the lamp trade only. Since all metal work has fallen into the hands of "firms"—some of them limited companies—the individual designer has disappeared; and unfortunately, he has taken his art with him.

WATER AND SANITARY AFFAIRS.

The shareholders of the East London Water Company had a much pleasanter story to listen to from the Chairman (Colonel Lockwood), at the half-yearly meeting last Thursday, than that which he had to tell them this time last year. Fate and the elements had combined against the Company; and while those who were responsible for the management of the undertaking had been unjustifiably attacked for not having works equal to the demands upon them, Parliament refused to grant the powers necessary for bringing them into this condition. Fortunately, thanks to the intercommunication scheme, the Company were able to maintain a full supply during the dry summer of 1899, much to the chagrin of their enemies, who were anxiously looking for a breakdown. Such a mishap did not happen; and it may be confidently hoped that one may now never occur. Altogether, the prospects of the Company are brighter. Parliament showed them greater consideration last session by passing the Bill which had been previously rejected—thereby conferring power to construct additional storage works and obtain more water; the new reservoirs in course of construction are proceeding satisfactorily; and up to the present time no extraneous assistance has been needed to keep up the supply of water, of which there is a good stock on hand. The position of the undertaking must therefore be most gratifying to the Directors and the Chief Engineer (Mr. W. B. Bryan, M.Inst.C.E.), upon whom rests the responsibility of furnishing one of the prime necessaries of life to a population numbering already 1,375,000 persons, and increasing at the rate of 40,000 per annum. The Company's supplies reach a total of 207,655, or more than those of the Grand Junction, West Middlesex, and Chelsea Companies combined. With this extensive business, it is an indication of good collection to find the loss from bad debts only £528 on a charge of close upon £200,000. The increase in the water-rates last half year amounted to £9612; and the average rate per house on the new supplies was £1 4s. 3¾d.—a reduction of 1d. on those put on during the summer of 1899. Colonel Lockwood complained of the imposition of the sinking fund forced upon the Company in 1886, and showed how it had detrimentally affected the dividends. But the fund is now a fixture, and will have to be borne. The profits of the half year allowed of the payment of a dividend at the rate of 7 per cent. per annum.

In the course of his remarks at the meeting above referred to, Colonel Lockwood expressed the hope that the obstruction and opposition to which the Company have been subjected for so many years may now cease, and the stability and value of the undertaking be allowed to further develop. In view of the events of the past decade, the wish may well be extended to all the other Metropolitan Water Companies. They have passed through a time of trial; but fortunately the progress of their business has not been checked. Testimony to this fact is borne by the Companies' half-yearly accounts; but it is shown even more clearly by the annual "Analysis" originated twenty years ago by Mr. Alfred

Lass, and continued by the firm of Messrs. Lass, Wood, and Drew. The latest of these most useful compilations (dealing with the financial year ending December 31, 1899, and March 31, 1900, has just been published); and it furnishes some instructive figures. We find that the total amount of capital authorized in respect of the supply of water in London is £20,742,252, of which £18,449,391 is employed—£18,345,186 having been expended on works which sent out 77,156,679,166 gallons of water; being at the rate of £239·12 per million gallons, compared with £241·23 per million in the previous year. The average daily supply for domestic purposes only was 162,118,514 gallons; for all other purposes, 48,133,170 gallons—the figures for 1898-9 being 157,452,692 and 46,580,715 gallons respectively. The average number of houses supplied during the year was 884,169, against 862,876; the population served being estimated at 5,953,529, against 5,875,003. The average daily supply for purely domestic purposes was 183 gallons per house and 27·24 gallons per head of the population—practically the same as for the year 1898-9. For all purposes, however, the figures are 238 and 35·32 gallons respectively. The number of houses on constant service at the close of last year was 29,836 more than at the corresponding period of 1898; 9628 being added by the Lambeth, and 7126 by the East London Company. The total income of the Companies was £2,363,246, against £2,275,951, or at the rate of £30·63 per million gallons, and £2·67 per house supplied. Maintenance and management cost £1,031,023, or £13·36 per million gallons and £1·16 per house; and the net profit was £1,056,569, or at the rate of 10·27 per cent. on the stock and share capital, as compared with 10·06 per cent. for 1898-9. The analyses of the Metropolitan Water Companies' accounts are followed, as last year, by those of the accounts of the Edinburgh, Glasgow, and Manchester Corporations. They show that in Edinburgh the supply of water produced a surplus of £5620; whereas in Glasgow and Manchester it resulted in deficiencies of £19,796 and £3199 respectively.

In a leading article which appeared a short time ago, "The Times" reviewed the results of the working of the Parish Councils Act, and offered some sharp criticism of the action of the members of some of these Councils for their dilatoriness in remedying the sanitary defects of the areas under their control. That the remarks of the leading journal were justified in many cases, there is too much reason for believing; but instances occasionally come to light where they are equally applicable to much more important bodies than those against which they were directed. If a small Parish Council are to be censured for slackness in the discharge of their duties, what shall be said to a Corporation—and especially that of a Royal Borough—who are equally remiss? By the merest accident, a worthy burgess of Windsor—a member of the Berkshire County Council—became possessed of an idea that a report by the Medical Officer of Health in regard to the insanitary condition of some cottages had been deliberately suppressed by the Town Clerk; and he accordingly, early in July last year, communicated with the Local Government Board on the matter, and requested them to hold a public inquiry. This was by no means the first time that the Board's attention had been specially called to the state of the borough; a deputation having waited upon Mr. Ritchie, as long ago as 1886, with the view of having an official investigation into certain allegations made in the previous year by a Special Commissioner sent down by the "Lancet." As the result of the interview, Dr. Hubert Airy and Mr. Arnold Taylor held an inquiry, and made some specific recommendations. They subsequently revisited the borough, and reported in detail as to what had been done. In response to the recent application, the Board sent down Dr. H. Timbrell Bulstrode to inquire into and report upon the representations which had been made, with "special reference to the extent to "which insanitary conditions of the kind pointed out in "1887 and 1889 by Dr. Airy and Mr. Arnold Taylor are "still existing."

Dr. Bulstrode made searching inquiry into the several allegations and a thorough inspection of the town, especially of the poorer quarters; and a copy of his report was received towards the close of last month. It is a very voluminous document—occupying eight columns of a local paper. Of course, it is impossible to give here even a summary of its contents. Suffice it to say that, while there is no serious complaint in regard to the water supply, the Corporation are charged with failing to adopt simple sanitary precautions, neglecting the drainage, permitting the accumulation of refuse, disregarding matters repeatedly brought to their notice by the Sanitary Inspector, and framing bye-laws but not enforcing them. There has, in short, been a slackness—or, as Dr. Bulstrode puts it, a "want of back-"bone"—in the proceedings of the Sanitary Authority. He says there has been too much action of an apologetic sort, too much non-effectual and more or less informal letter-writing—in a word, there has been "indecision in dealing with "the matters under consideration." This severe criticism will doubtless have permanent good effect. That it should have been called for in a borough whose residents are for some few months in the year actually in touch with Royalty, does not show a very keen appreciation of their duties and responsibilities by those who are entrusted with the administration of its affairs. On the contrary, it shows, as Dr. Bulstrode says, a want of "the initiating and guiding "force necessary for vigorous administration." Though the gentleman whose action brought out this rebuke was mistaken in the matter of the alleged deliberate suppression, he deserves the thanks of his fellow-townsman; for, in a post-script to his report, the Inspector expresses his pleasure in appending a memorandum by the Corporation, as the result of a meeting held after his visit, showing that many of his criticisms have been already acted upon. The report was discussed by the Town Council last Wednesday with closed doors; a motion that their deliberations on this important matter should be open to the public having been rejected.

The "Kugel," or Globe High-Pressure Gas-Light.—Herr Salzenberg, the Manager of the Crefeld Gas-Works, who has invented the system of high-pressure incandescent gas lighting, known in Germany as the "Kugellicht," and in France as the "Lumière Boule," asks us to correct an erroneous impression which certain references to his system at the International Gas Congress at Paris may have created. He claims to use gas under a compression of "one atmosphere *and upwards*," and not, as some references to his system imply, of one atmosphere only. This is apparent from the translation of the paper that he read before the Congress, which appeared in our columns last week (p. 837), in the course of which it is stated (p. 838): "The gas can be compressed quite well to 10 atmospheres in a metal reservoir, although for practical purposes the increased motive power required limits the compression to about 3·5 atmospheres. The actual pressure of combustion must not fall below 1·1 atmospheres." The patents protecting the system in all countries claim the use of pressures of 1 atmosphere *and upwards*.

Lighting Industries Exhibition in Vienna.—An exhibition will be held from the 1st to the 30th of next month, in the rooms of the Austrian Horticultural Society in Vienna, of appliances and inventions relating to artificial lighting. The exhibits will be classified in fourteen groups, as follows: (1) Historical Objects of Methods of Artificial Lighting; (2) Light for Devotional Purposes, and Church Lighting; (3) Public Lighting; (4) House Lighting; (5) Lighting of Schools, Hospitals, &c., and Light in Hygiene and Medicine; (6) Factory Lighting; (7) Lighting of Vehicles, Railway Carriages, Ships, and Lighthouses; (8) Military and Naval Lighting; (9) Light in Photographic Processes; (10) Lighting Arrangements for Night Operations, and Fire-Risks; (11) Lighting of Mines; (12) Decorative Illuminations; (13) Sundry Objects; and (14) Literature of Artificial Lighting. The arrangements for the exhibition are in the hands of Professor F. Kleinpeter, Herr E. Sehnal, Imperial Surveyor, and Herr L. Weiss, publisher. The exhibition is announced as the first universal one for all methods of artificial lighting.

Calcium Carbide Works in Great Britain.—With reference to our comments on the list of carbide works in Great Britain given by Professor Vivian B. Lewes in his work on "Acetylene" (*ante*, p. 464), and to the paragraph on the subject in the "JOURNAL" for the 18th ult. (p. 690), we have now to add that we have made further inquiry respecting the works reported to be in operation, or under construction, at Blackburn and in North Wales. At Blackburn, Messrs. Ashton, Frost, and Co., Limited, of the Bank Top Foundry, were reported to have 200-horse power engaged in the manufacture of carbide. A private inquiry directed to this firm, asking for confirmation of this report, has however elicited no reply. It would seem scarcely probable, nevertheless, that this Blackburn works is identical with the small works at Chatburn, near Clitheroe, referred to by Mr. Fowler in our issue of the 25th ult. (p. 786). Our information as to a works of 4500-horse power under construction in North Wales was derived from the German technical Press. A firm of Engineers (Messrs. Fried. Krupp Grusonwerk, of Magdeburg-Buckau) who were reported to have supplied machinery for these works, inform us, however, that the Foyers factory is the only one in Great Britain which they have supplied, and that they are not aware of the existence of works in North Wales. Consequently, the only calcium carbide works of the existence of which in Great Britain at the present time there is no question are the works of the Acetylene Illuminating Company, at Foyers, N.B., and those of Messrs. Tinker and Holliday, Limited, at Hazlehead, Sheffield.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 912.)

THE Stock Markets have at last got a foretaste, as they hope, of the good time for which they have more or less impatiently been waiting so long. Last week saw quite a revival of cheerfulness; and though business might well have been a bit more plentiful, yet it was distinctly a change for the better. There was an almost uniform advance in prices throughout all departments, with only a fall here and there to chequer the list. There can be no doubt that the result of the elections has had much to do with this; for only with a strong majority can either party aspire to give John Bull's house the setting to rights it requires. In the Money Market the supply was very abundant, and short loans were obtainable on very easy terms. But looking further ahead, discount rates had quite the reverse tendency. The Gas Market marched in line with the rest, and took its share of the general brightness and revival of activity; and now that the holiday season is pretty well over, we may perhaps look for this state of things being maintained. Prices in general keep steadily pushing up; and some moderate advances were scored in the week. In Gaslight issues, the ordinary was pretty active right through to the close. Opening at a fraction below par, it touched 100⅝ more than once; and the quotation closed at an advance of a point. The secured issues were very much neglected, and gave no sign. Dealings in South Metropolitan were rather quieter; but the tendency was buoyant, and the selling price was advanced two points. Nothing at all was done in Commercials; and present prices are not good enough to tempt holders to part with their stock. The Suburban and Provincial Companies were inconspicuous, and made no sign. The Continental group were in undiminished strength; and some issues added further gains to their recent advances—Union being especially buoyant. The remoter undertakings were unmoved, with the exception of a reduction in Oriental part paid. The Water Companies were generally firm; and several moderate improvements on quotations were made. New River, however, was a little lower.

The daily operations were: Gas opened very firm on Monday; but business was only moderate. Prices all round were good; but only Continental Union advanced 1. Transactions on Tuesday were on much the same level, with marked strength. Union rose 2; and Gaslight ordinary and Imperial Continental 1 each. Lambeth Water gained 5. Wednesday was noticeable only for a further improvement of 3 in Continental Union. Thursday was moderately active; and South Metropolitan moved up 1. In Water, East London rose 2, Southwark 1, and ditto "D" 3; but New River fell 2. Friday was dull; and quotations did not move. Saturday was quite quiet. Oriental £4 10s. paid fell ¼.

ELECTRIC LIGHTING MEMORANDA.

The Liability of Electric Cables to Deteriorate.—The Importance of Depreciation.—The Gains of Electric Science: Dr. Bose's British Association Paper.

IN the current number of the "Electrician" there appears a statement relating to the liability of electric cables to deteriorate, which is singled out by our contemporary for somewhat apprehensive comment. It originated in a communication by M. Georges Rheins to the "Comptes Rendus," to the effect that, when an insulated electric cable is used for the transmission of current always in the same direction, it passes through four stages of deterioration, marked by the complete loss of some electric property and a change of the properties remaining. The first property to go is inductance, followed in order by capacity, insulation, and conductivity. This process of deterioration is due to the slow penetration of the metal of the core into the insulation surrounding it; and the phenomenon appears to be independent of the kind of dielectric used, since it has been observed both in the case of paper and also of gutta-percha. In one instance of the latter kind of insulation, in use for twenty years, the copper of the core was found to have soaked through to the surface of the insulator. In another case, of a papered cable used only four years, the copper was found to have penetrated into the first layer of paper, but not into the second. Here is a nice "secret" for the electric lighting interest, especially where public money has been spent lavishly on electric mains, without provision for depreciation. The "Electrician" very properly draws attention to the statement, and suggests that some experiments on the "life" of electric mains should be instituted. The suggestion is a little late. Plenty of experiment of the kind is actually going on, and will have to go on to the inevitable end, whatever this may be.

If M. Rheins is to be trusted, there will be a sad awakening for some confiding ratepayers. Of course, the statement may not possess any industrial importance. It is not said under what conditions the discovery of the "Rheins effect," as it will presumably be called, was made. We are not told where the cables in question were laid, what they were used for, or, indeed, anything about them. Hence our contemporary properly remarks that, before any definite conclusions can be accepted one way or the other, it must be made clear that the discovery was not of the "mare's nest" order. When the conditions are established, the effect must be reproduced and accelerated, if possible, on selected test lengths of cable, in order to get to the bottom of it. Meanwhile, it ought not to be difficult to find samples of electric light and power cables that have been at work for at least ten to twelve years, and ascertain whether they have suffered any real electrical or physical deterioration. Still, whatever may come for the moment of M. Rheins's announcement, those who are responsible for the money spent on electric cables should be advised against relying on the assumption that these things are everlasting. We do not know what goes on inside an electrical conductor; but we can at least surmise that a good deal of strain is put upon it somehow, and that this will be borne for any length of time without alteration in the nature of the substance is incredible.

The electricians have been meeting in congress in Paris, like all the rest of the scientific and technical world, and so paying homage to the great nation that has always tried to honour Science and Art above every other. The transactions of the congress were not particularly inspiring. The papers appear to have been of "fair to middling" quality; but their subject-matter was not of the highest importance. English electrical science was not so completely "out of it" as English gas engineering was at the gas technicians' congress; but American electrical work seems to have had no representation at all. This is to be regretted; because when all is said and done, England and America are the first workshops of the world, and have more uses for electricity than any other countries. There are many unsolved problems of electrical technics that might well have been discussed at an international congress. It should be recorded here that by far the most striking contribution to electric science for the year was the paper by Dr. Chunder Bose, of Calcutta, read at the British Association meeting. This remarkable paper goes to the heart of physical things in a way that makes the reader gasp and hold on to something lest he should fall into the Infinite. When it is stated that Dr. Bose actually treats of his successful experiments with an artificial retina, which responds to invisible as well as to visible lights, and "exhibits an automatic recovery," it is unnecessary to say more for the astounding character of his researches. One of our electrical contemporaries goes so far as to remark of Dr. Bose's results that they seem to bring us to the brink of a stupendous generalization in the physical sciences; and the observation is no exaggeration. Take this simply-worded statement: "I have been able to construct several curious receivers which are sensitive to radiation, and also exhibit an automatic recovery. One of these responds, not only to visible, but also to invisible lights. It is very strongly affected by electric radiation; the same receiver responds, not only to heat radiations, but also to different coloured lights. The action of this receiver is probably somewhat complex." Again, Dr. Bose has been led to regard some phenomena as containing the possibility of bridging over the gulf which separates physiological from psychological processes! He ventures upon an explanation, based on a physical analogy, of memory itself. He says, of certain phenomena, "it is difficult to draw a line and say 'here the physical process ends and physiological process begins,' or 'that is a phenomenon of inorganic matter and this is a vital phenomenon peculiar to living organisms,' or 'these are the lines of demarcation that separate the physical, the physiological, and the beginning of psychical process.' Such arbitrary lines can hardly be drawn." We must wait patiently for the development of these inferences, for they are scarcely more at present.

GAS ACTS OF 1900.

THE following Acts relating to gas supply were added to the Statute Book last session:—

The Bedford Gas Act authorizes the raising of £40,000 of additional 7 per cent. ordinary or 4 per cent. preference capital. One-third borrowing powers are granted. Clauses are added requiring mains to be laid under the superintendence, and to the reasonable satisfaction, of the Borough Surveyor, and ordering a map of the mains to be deposited with the Town Clerk.

The British Gaslight Company, Limited (Staffordshire Potteries), Act authorizes the application of an additional capital sum of £75,000 to the station named. Of this amount, £50,000 is to be 5 per cent. capital stock of the Company; and the balance must be 4 per cent. loan capital—to be borrowed on the best terms obtainable at the time. The works are to be extended on lands to be acquired for the purpose.

The Cleethorpes Gas Act consolidates and converts the capital of the Company into a uniform 5 per cent. stock. This operation is not to increase or affect the borrowing powers of the Company. New stock to the amount of £60,000 is authorized, with one-third loan. The initial price is 3s. 9d. per 1000 cubic feet. [It was 6s. by an Order of 1879, now altered.] Additional gas lands may be acquired for the extension of the works, subject to a clause protecting the gathering-ground of the Great Grimsby Water-Works Company. Power is given to use pipes for ancillary purposes. The Company may deal in (not manufacture) gas-fittings. Prepayment for short-period gas supplies may be demanded, without the obligation to allow interest.

The Grantham Gas Act extends the limits of supply to include the parishes of Great Gonerby and Barrowby. The classes of shares in the Company are to be consolidated into an equivalent amount of 5 per cent stock, with the addition of £45,000 of new capital. The borrowing powers are enlarged to one-third of the nominal amount of the consolidated stock created and issued.

The Company may deal in, but not manufacture, gas-fittings. The maximum price is reduced from 6s. to 5s. per 1000 cubic feet, for 15-candle gas. Clause 41 empowers the Company to specify the size and material of service pipes. This clause is in substitution for the proposal of the Bill to inspect consumers' internal fittings. The power has been restricted to the service pipe, the meter, and covered pipes on the consumers' premises. Appeal is to a Court of Petty Sessions.

The Hartlepool Gas and Water Act consolidates and converts the share capital of the Company into a 5 per cent. maximum ordinary stock, with the addition of £150,000 of new gas capital. The loan capital is in the proportion of one-fourth. The Bill proposed to raise £200,000 of additional capital.

The Kingston-upon-Thames Gas Act gives the Company the power to acquire additional gas lands, and extends the district of supply. The old capital is consolidated into 5 per cent. stock, with £107,500 additional. The Company can only borrow £33,333 in respect of the consolidated existing capital stock, inclusive of a present mortgage of £25,000; but on the new issue the loan may be one-third of the amount paid up. The old maximum price of gas (dating from 1854) is given up, and the sliding-scale enacted, with 3s. 6d. per 1000 cubic feet as the initial price, as asked in the Bill. Gas for the public lamps is chargeable at the lowest prevailing price. Pipes for ancillary purposes may be laid with the consent of the Local Authority. Gas of 15-candle power is to be supplied, tested on the works. Candles are to be used as the standard of light until Parliament or the Board of Trade shall order the adoption of another standard for testing London gas. One test only is to be applied, after the gas has been burnt for at least 15 minutes. No forfeiture shall be incurred for defect of illuminating power or purity assignable to unavoidable cause or accident; and in the case of an excess of sulphur, unless the accident shall amount to 2 grains upon the average of six consecutive days, or 10 grains upon any one day. In the event of the Gas Examiner finding any defect, he is forthwith to notify the fact to the Company. The Company may deal in, but not manufacture, gas-fittings. They may contract for the supply of gas in bulk beyond their district, but not to the injury of the district. Application may be made for an Electric Lighting Order, but not for Kingston or Surbiton without consent of the Local Authority. Clauses are inserted for the protection of the London and South Western Railway, and the Surrey County Council (in respect of main roads and bridges).

The Maidenhead Gas Act converts and consolidates the old capital into a uniform 5 per cent. stock, with the addition of £60,000. Only £10,000 may be borrowed in respect of the original consolidated stock of £56,800; and one-fourth of the amount of the new issue. The gas-fittings clause, as in the preceding Acts, is inserted. The sliding scale is enacted, with 4s. and 4s. 3d. per 1000 cubic feet as the initial prices of gas supplied respectively within and beyond a distance of a mile and a half from the Maidenhead Town Hall. Gas of 15-candle power is to be supplied, with no penalty for default ascribable to accident or unavoidable cause.

The Newport (Mon.) Gas Act extends the Company's district of supply, and consolidates the existing stocks and shares into a uniform 5 per cent. stock, with power to add £150,000. The borrowing powers are £48,530 on the old stock of £194,120, and one-fourth of the amount of the new issue. The Company are authorized to acquire the undertaking of the Caerleon Gas Company by agreement.

The Redhill Gas Act gives the Company compulsory powers to purchase lands for gas storage—subject to a clause protecting the Corporation of Reigate. Additional 5 per cent. capital is authorized, to the amount of £75,000, whereof not more than £30,000 may be raised as preference capital. Borrowing powers are one-third of the amount of the issue. The standard price for gas is 3s. 6d. per 1000 cubic feet within the borough, and 4s. beyond, with a margin of 4d. for reduction without corresponding increase of dividend.

The Rugeley Gas Act incorporates a Gas Company originally formed in 1847. The capital of the Company is £30,000, composed of: £20,000, representing the share capital of the limited Company; capital stock of £4000, representing the amount expended by the limited Company out of revenue upon extensions and improvements; and £6000, additional capital. The whole of this stock is to bear a 5 per cent. dividend. Clause 32 of the Act empowers the Directors, at their discretion, to annually appropriate out of the Company's revenue, and as part of the expenditure on revenue account, any sum not exceeding 1½ per cent. on the paid-up capital (but not exceeding £120 in any one year) to be called the "Renewal Fund," and to be chargeable with the renewal and repair of works and plant. The fund must be invested, and may be accumulated at compound interest until it amounts to 5 per cent. on the paid-up capital, after which the interest is to be carried to the amount available for dividend. The borrowing powers are one-fourth of the "original" capital of £24,000; and the same on the additional capital. [The converted stock is thus to be the datum for the loan capital.] The initial price is 4s. 3d. per 1000 cubic feet for 15-candle gas, tested on the works or within 200 yards from any part thereof. The Company are empowered to deal in, but not to manufacture, gas-fittings. The provision asked for in the Bill, for all consumers' connections to be made under the supervision of the Company, has been struck out. Discounts up to 20 per cent. are sanctioned. The Company are authorized to apply for an Electric Lighting Order. The gas-mains are to be extended into any street within the district of the Urban Council, upon a sealed requisition by the Council guaranteeing for five years a profit return of 10 per cent. on the outlay. The Council may promote a Transfer Bill in any of the next five sessions of Parliament, without opposition except on clauses. In ascertaining the transfer price, the arbitrators are to proceed under the Lands Clauses Act, as for compulsory purchase. They are also to have regard to the value of surplus works. The Company are to receive the costs of the present Act; and the Council will pay all winding-up expenses, and the value of the stock-in-trade.

The South Metropolitan Gas Act varies the standard price of gas with the illuminating power. As from July 1 next, 15-candle gas is to be supplied at the standard price of 3s. 2d. per 1000 cubic feet. After July 1, 1905, the illuminating power is to be dropped to 14 candles, at a standard price of 3s. 1d. It is provided, however, that the reduction may be accelerated on giving notice. In testing the gas, it is to be burnt at such a rate as shall give a light equal to 16 candles, with a suitable chimney when the quality shall be reduced to 14 candles. On demand, the Company are to provide free of charge burners suitable for the grade of gas supplied. The Act authorizes the construction of a branch railway into the East Greenwich Gas-Works (subject to certain condition) within five years. It is enacted that the form of accounts published by the Company shall show the actual and nominal (converted) amounts of the ordinary capital and debenture stock upon which the Company pay dividend and interest.

The Wandsworth and Putney Gas Act authorizes the acquisition by the Company of additional gas lands, subject to particular conditions. Certain thoroughfares are to be stopped up. The existing capital of the Company is consolidated and converted into a uniform 5 per cent. stock; and the debenture stocks into a new 3 per cent. debenture stock. Additional capital to the amount of £300,000 is authorized, with one-third loan. The standard price of gas is unaffected by the Act. The Local Authority are to be notified of the laying of mains in undedicated roads. The sulphur impurity of the gas is not to exceed 20 grains in 100 cubic feet, subject to the Kingston provisions as to penalty. The Wandsworth District Board of Works may provide and maintain two testing-places for Wandsworth and Putney respectively. The Company convey to the District Board a piece of riverside land.

The Wolverhampton Gas Act authorizes the construction of new gas-works on a scheduled site—subject to the proviso that no chlorine or sulphuric acid shall be manufactured thereon, and that not more than 30 per cent. of the output shall be water gas. Any workmen's dwellings to be erected by the Company are to come under the local building ordinances. Additional capital to the amount of £140,000 is authorized—to carry a 6 per cent. ordinary or a 5 per cent. preference dividend, and one-fourth borrowing powers. A fittings inspection clause (as in the Rugeley Act) is inserted. No penalty for defective supply is to be levied in case of accidental or slight and unimportant shortcomings not materially affecting the value of the supply. The Corporation of Wolverhampton may during the next and succeeding sessions of Parliament promote a Bill to purchase the undertaking by arbitration.

The Metropolis Gas (Prepayment Meter) Act forms a class by itself. It enacts that gas supplied by the London Gas Companies through prepayment meters is not to be charged at a higher price than that otherwise supplied. A maximum surcharge of 10d. per 1000 cubic feet of gas is sanctioned for prepayment-meter supplies, which is to cover the providing of the meter and fittings and every other cost of the service. This rate is subject to revision by the Board of Trade, upon stated conditions, after seven years. Accounts to be rendered to prepayment-meter users must show clearly the charge for gas and the rate for the meter and fittings. The maximum charge for the hire of a prepayment meter without fittings is 10 per cent. on the cost of the meter to the Companies; and all the Acts applicable to ordinary meters apply so far as may be to prepayment meters.

A Steam-Meter.—In the abstracts from "Ingenioren," of Copenhagen, which have been published by the Institution of Civil Engineers, a description is given of a steam-meter of interesting construction designed by Herr A. Friedeberg, of Berlin. Its action is to condense and measure continuously a portion of the steam flowing through the main steam-pipe. Inside a horizontal length of the main a flap-plate suspended from a horizontal axis actuates, by means of an internal sector and rack, a conical plug-valve controlling an opening in the top of the main. When no steam is being used, the plate hangs vertically, and keeps the valve closed. When steam is flowing through the main, it turns the plate more or less towards a horizontal position—thereby opening the valve correspondingly; and the steam escaping through the valve is condensed in a worm. The water from the worm is either collected in a measuring tank provided with a gauge-glass, or is delivered on a bucket-wheel, the revolutions of which are indicated upon a counter arranged to show the corresponding quantity of steam flowing along the main.

A SKETCH OF THE HISTORY OF THE GAS SUPPLY OF NEW YORK.

[Second Article.]

In June, 1863, a venture called the Anthracite Gas Lighting and Heating Company obtained from the Board of Aldermen of the City of New York a grant of powers to lay pipes in every street and public place under their jurisdiction, for a period of fifty years. This Company did nothing for eight years, and sold their franchise in 1871 to the Union Gaslight Company. Influential speculators and city politicians had discovered that there was money in gas franchises. Accordingly, in 1866 another Company—called the Mutual Gaslight Company—was brought out, and obtained a franchise for thirty years. Meanwhile, the Manhattan and all the other Gas Companies actually doing business in the city formally terminated their street-lighting contracts with the Corporation, which included the condition, originating with the formation of the Manhattan Company thirty years before, to supply the public lamps for $15 a year apiece. They served the authoritities with notices that, as from the beginning of 1865, their price for street-lamps would be $53. Without showing cause for the opinion, Mr. Myers describes this joint action of the established Companies as part and parcel of the corruption that ruled the city affairs under the *régime* of the notorious "Tweed Ring." Yet he admits that the city authorities of the day objected to the increased charge, and only paid it after the Harlem Company had obtained judgment against them in the Superior Court and Court of Appeal. This does not look much like corruption, on either side. What it does indicate to us is that the Gas Companies declined to continue bound to light the public lamps at a loss, if the Board of Aldermen were bent upon inflicting competing concerns upon them. We also suppose that the Courts would not have supported the action of the Companies if it had not appeared right and reasonable in the circumstances. The price of $53 per lamp continued in force until 1872.

In 1876, the Knickerbocker Gaslight Company came upon the busy scene; buying the franchise of the Union Gaslight Company, which was then in the hands of a receiver. The same year saw the birth of yet another Gas Company—the Municipal. These new undertakings meant business; the Knickerbocker setting the pace by paying their President a salary of $500,000 a year, and dropping the price of gas to $2 per 1000 cubic feet. This happened in 1878, and was the signal for an outbreak of cut-throat competition, during which some consumers got their gas for 75 cents per 1000 cubic feet. In a couple of years, the Knickerbocker Company were absorbed by the old Manhattan, and a pooling agreement was entered into by all the New York Companies. This arrangement, dated 1880, fixed the price of gas to private consumers throughout the city at $2·25. A capital charge of $1·25 per 1000 cubic feet of gas sold was set aside for dividend, and apportioned every three months among the Companies in proportion to their actual sales of gas. Competition for business was barred.

A new Company—the Equitable—was brought out in 1882, to get a share of the huge profits the Associated Companies were believed to be making. At that epoch, any Company could lay pipes in New York by consent of the Mayor, the Comptroller, and the Commissioner of Public Works. The Companies accordingly exerted their influence, and obtained the repeal of this ordinance by a vote of the Board of Aldermen. The Mayor, however, vetoed the repeal; and the Equitable Company obtained their franchise on the score of their offering to compete with the old undertakings. These adventurers engaged to pay into the city treasury 20 cents for every lineal foot of trench opened for their mains; to supply the public lamps at $12 per annum; and to charge $1·50 per 1000 cubic feet for gas supplied to the city buildings, and $1·75 per 1000 cubic feet to private consumers. The Mayor—Grace—plumed himself on his share in this business. The Equitable Company built works and sold gas at the agreed price in 1884; but in the same year the Associated Companies united more closely, and formed the Consolidated Gas Company, with a nominal share capital of $45,000,000. In the following year, a Committee of the State Senate investigated the affairs of this organization. The result was to show that the nominal capital was more than double the actual sum invested. It was also given in evidence that the cost of manufacturing gas in New York was only about 45 cents per 1000 cubic feet, and that nearly one-half of the gas-rental was clear profit. In consequence of this report, a Bill was brought into the State Legislature reducing the price of gas in New York to $1·50 per 1000 cubic feet. The Bill was lost; but the following year another one was carried, cutting down the price of gas to $1·25 per 1000 cubic feet. "This relief measure quieted public agitation for ten years." But it did not check the inroad of new Gas Companies, all anxious to pick up what profit they could at the legal price of gas. Among these were the Standard and the East River Companies; the latter with works at Ravenswood, and a tunnel for trunk mains under the East River itself. For this franchise, the Company engaged to pay into the city treasury a subvention of 3 per cent. on the gross receipts of the undertaking. The tunnel was destined to play a very important part in the final settlement of the New York Gas Question. In the meantime, though there was no actual cut-throat competition as from the advent of the new Companies, the streets were gridironed with rival mains; and while ostensibly keeping to the legal price of gas, the Companies engaged in lavish canvassing, and beat one another down in various ways. Once more the Companies, or the majority of them, combined in 1896 and made a districting agreement. They ceased convassing, and paid off thousands of agents who had been employed in this way. Free gas-stoves and connections, and other baits for custom, became things of the past.

When the fresh combination became known, the State Legislature was again moved to inquire into the matter of gas prices, and eventually an Act was passed reducing the price to $1 within five years, by yearly reductions of 5 cents per 1000 cubic feet. This is the law at the present time. In 1896, however, another bid for a franchise was made by a venture calling itself the Consumers' Fuel, Gas, Heat, and Power Company. The Board of Aldermen first granted, then withdrew, this ordinance. In January, 1898, the Equitable and the East River Companies amalgamated under the name of the New Amsterdam Gas Company. By this manœuvre for mutual protection, the only two Companies that were under obligations to pay anything into the city treasury for their franchises contrived to throw a veil over the extent of their liabilities in this regard. The one that had to pay on the mains will lay no more pipes; and the one that paid a percentage on gross receipts will never do any more business on its own account. Then came the last "rate-war" of 1899, which put an end to the division of interests in the gas and electric lighting of New York. Mr. Myers does not mention the Act of the State Legislature requiring the consent of frontagers to the grant of any new gas franchises; but until this law is repealed, the public will not be troubled with any more "gridironing" of the streets. He does mention a certain abortive "Astoria grant," which finishes his story. It is a tale of a Bill brought into the State Legislature, apparently on the orthodox English lines, to authorize the making of a tunnel under the East River, in order to connect proposed gas-works with pipes in New York. Mr. Myers complains of this scheme chiefly that it proposed to reclaim 16 acres of land actually under water, and not to make any compensation to the city. "At Governor Roosevelt's request, a special clause providing for a 3 per cent. payment was inserted. Even in this form, the Bill was bitterly attacked, as giving away a franchise worth millions of dollars." The Bill did not pass. Now the land in question is sold; but whether the purchasers are the Consolidated Gas Company or not, does not appear.

It seems a pity that Mr. Myers, who writes on this subject so intelligently and instructively, does not say outright whether he holds that gas franchises should be paid for, and in what manner. We in England hold that the statutory permission to trade is of no intrinsic value. There is no price for Acts of Parliament. If the business conducted under statutory permission prospers, the public get a return upon the value of the franchise, first, in the cheapness and goodness of the service rendered; secondly, in the rates and taxes paid by the undertakers. Is not this better than all the subventions on mains laid, or artificial charges on the gross receipts? To talk of a franchise for a competing gas supply to New York as "worth millions," is without meaning. What is the intrinsic value of a United States patent?

It further appears that the State Legislatures of America, with their power of fixing the maximum price of gas anywhere, have all that is necessary for the protection of the public against the effects of over-capitalization. It cannot matter to the public a jot whether the Consolidated Gas Company elect to pay dividends calculated on twice the amount of money actually subscribed, or on the real investment. The State authorities will get their taxes on the true value of the property; and the Legislature can order the Company to make the best they can out of gas sold at whatever figure they judge to be reasonable. There has already been talk of a Bill fixing the price of New York gas at 75 cents per 1000 cubic feet. At present, the law fixes it at $1 as from the beginning of next year. There are probably a dozen men at Albany, the State capital, who could tell off-hand the lowest price at which the Consolidated Gas Company could afford to sell gas and pay an honest dividend. When such a figure is put into a Bill, that Bill passes. The Company may protest; but they will submit. Not so if the Legislature were to order a ridiculous reduction of price, at which the makers could not pay their way; but then, civilized Legislatures do not consciously pass unjust and oppressive laws.

These articles on the gas affairs of New York cannot be concluded without reference to the contemporary outbreak of a "war of rates" between the Gas Companies serving Chicago. There have been two leading Chicago Gas Companies—the People's Gaslight and Coke Company, and the Ogden Gas Company. Both undertakings possess franchises, and did a concurrent, if not exactly a competing, trade. The People's Company was the larger concern, and tried to buy up the Ogden property. For some unexplained reason, the bargain fell through; and then the People's Company schemed to bring out a third concern, called the Municipal Company, to compete at drawn daggers with the Ogden Company. The new comer was to take gas from the People's works, and distribute it at any price to be had, in the Ogden district. Not to be cornered, the Ogden people promptly dropped their price to 50 cents, which was one-half of the usual figure for Chicago. As the People's Company own that gas costs 62½ cents per 1000 cubic feet to make, both sides

must be losing money fast. Hundreds of men on each side are running mains everywhere, putting in connections, and pulling out the opposition meters. Naturally, the public are interested; and gas consumers are thinking of "free gas, or even better." The attention of the Illinois State Legislature might profitably be directed to this shocking waste of money. So long as competition in gas supply is permitted (even encouraged) by law, these financiers' attempts to put an end to it by the ordeal of battle may be expected. This is sufficient answer to those who imagine that competition in gas supply is not only expedient, but feasible. Capital, acting in this connection like a thing of sentient life, knows better. Capital, as we have already remarked, will submit to control, even up to the very limit of natural law in respect of profitable gas manufacture. It will take 50 per cent. dividends, if they are to be had; but it will accept 5 per cent. rather than nothing at at all. It is intolerant of economically indefensible competition; and two gas companies, offering the same commodity in the same district, is a spectacle abhorrent to its sense of fitness. There is no excuse for it. Other means for protecting the public against the abuse of a natural monopoly must be found. Mr. Myers does not know of any that can be safely relied on, where the monopolists are recalcitrant, fraudulent, or simply stupid. "No doubt the reduction of the price of gas by the Legislature has been beneficial; but it is a method of control far from ideal." He is bold enough to declare that the plan of requiring a reduction of price after profits have reached a given figure is no better. It is a pessimistic conclusion; but we cannot find fault with it. A legislative assize seems the only practical check upon monopolistic greed or inefficiency.

RECENT NOTEWORTHY JUDGMENTS.

At the close of the judicial year, our contemporary the "Law Times" publishes a summary of the chief decisions which have marked the course of that year; and from the articles contained in our contemporary's issues for the 15th and 22nd ult., we take the following notes of those cases which are of interest to our readers. The majority of these decisions of the Courts have been already noticed or reported in our columns from time to time; but their collation may usefully recall the points involved, and also be of service for purposes of future reference.

Workmen's Compensation Act.—Appeals under this Act were, for the first time, dealt with by the House of Lords during the period under review. It was held by the final court of appeal that, where a workman who had sustained an injury had sent to his employers within six months thereof a notice of the accident, and also a notice that he claimed compensation, the requirements of the Act as to the claim for compensation had been met, notwithstanding that the initiation of proceedings in the County Court had been postponed until after the expiration of the six months (*a*). It has further been held (*b*) that the expiry of this period is not an absolute bar to proceedings, if the parties have agreed as to liability, but have held over the consideration of the amount. Such an incident would estop an employer from setting up as a defence that the request for arbitration was out of time.

A series of decisions (*c*) goes to show the meaning of the word "accident" within its signification in the Act of 1897. The essence of the whole matter is that there must be something fortuitous and unexpected in the occurrence of the injury. It is not an accident if injury be suffered by a man owing to his being in impaired physical condition. But, on the other hand, a misfortune which has happened to him, not caused primarily by his impaired condition, but, it might be, aggravated by it, would come within the conception of an "accident" in this particular Act.

One of the most important judgments decided, on the authority of the Court of Appeal (*d*), that a man must have been at least two weeks in the employment in which he is injured in order to be entitled to compensation. This point, and that raised by the decision (the reference to which is not given) that a man's dependants are not entitled to compensation in the event of his death by accidental injury unless he has been two weeks in the service of his employers, will probably ultimately reach the House of Lords; and we venture to think the judgments will be there reversed.

Relief from the Rates for Men on Strike.—The decision of the Court of Appeal (*e*) upon this question was one that attracted considerable notice, and may be said to be the only noteworthy judgment, apart from those already mentioned, bearing upon the relations between master and servant. Here the Guardians had been backing up the miners on strike by making allowances to able-bodied men who could, but would not, work; and an application was made to the Court to restrain such action. Lord Justice Romer, who first heard the case, held that Guardians need only satisfy themselves of the fact of destitution before affording relief. The Court of Appeal, differing, have held that relief may be given to the families of men on strike, or to workmen prevented from earning their living by a strike not of their making. Strikers, however, who can have work and will not do it are not entitled to be supported in idleness out of the pockets of the ratepayers. We commented at the time upon the difficulty of administering the poor law in accordance with this judgment. Our contemporary remarks that the decision "illustrates neatly how great are the limitations to strict logic when administering the law of a highly civilized community."

The Law of Cutting Off.—It has been held by Mr. Justice Wright, in *Re Flack; ex parte Berry* (*f*), that where a person is adjudicated a bankrupt, and the trustee takes possession of his premises the water-rate upon which is in arrear, the company cannot cut off the water upon the trustee's refusal to satisfy the arrears; for the trustee is an incoming tenant, and not liable for them.

Patent Law.—The decision of Mr. Justice Buckley, in the case of *Welsbach, &c., Company v. New Incandescent, &c., Company* (*g*), which has figured largely in our columns, is briefly referred to by the "Law Times" as bearing upon the *quantum* and nature of utility necessary for the support of a patent. It is now held, says our contemporary, that a very small amount is required; and a patent only implies that an invention is better in some respects than what was existing, and not necessarily in every respect. Thus, if an article, good in itself, though it may not be so good as one previously known, can be produced more cheaply, there would be presented the element of utility; or, again, an article is patentable which gives purchasers a useful choice.

Posting Allotment Letters.—Mr. Justice Cozens-Hardy decided a point which is of some value as serving to emphasize the importance of care in the despatching of all letters, and especially of any the posting of which it may at some future time be absolutely necessary to technically prove. Those only who have had close acquaintance with the preparation of evidence in cases where it is essential to be able to prove the delivery of instructions or documents, know the enormous amount of trouble that is caused by the lax manner in which many companies allow the despatch of their letters to be effected. In the case referred to, A applied for shares in a company, but, changing his mind, wrote a letter withdrawing his application, which letter was duly posted, and was received by the secretary of the company. In the meantime, however, the allotment letters had been prepared; and, about an hour-and-a-half before the withdrawal was received at the company's office, they were handed to a postman outside St. Martin's-le-Grand, who, for a small fee, offered to take the letters inside. Owing to delay in the despatch of these letters, and consequently in their receipt by the applicants, A claimed the return of his deposit and the cancellation of the allotment made to him The Judge held that A was entitled to claim for the removal of his name from the register, and for the return of his deposit (with interest at 4 per cent.), on the ground that the postman was not the agent of the Post Office for the purpose of taking charge of letters to post them, and that the letter did not necessarily become within the custody of the department directly it entered its doors. Consequently, the company failed to prove that the acceptance had been posted before 8.30 a.m., the hour at which the withdrawal had, it was proved, reached the secretary's hands.

In concluding its summary of the noteworthy decisions of the judicial year, from which the above notes are compiled, our contemporary remarks that "in wideness of scope the record for the past year will bear comparison with its predecessors. Imperfections exist in case-law, as in everything else depending on human endeavour; but the clean-cut language of a considered judgment—terse, clear, and decisive—compares very favourably with . . . . some of the statutes of the present year of Grace. A perusal of the cases to which we have drawn our readers' attention renders it impossible to withhold a humble tribute of admiration for the intellectual forces there displayed—forces which must necessarily appeal with special power to lawyers who know the complexities of the subjects through which a plain path has been driven. However great this mental grasp, the public would not respect decisions were it not for the moral influence they possess. Both litigants and their advisers are conscious that our case-law, unlike our legislation, is unaffected either by fear or favour." That is an eulogium in which we can all join; the unfortunate fact is, however, for the litigant, that good law is often, if one may use the expression, bad justice.

a. "Powell *v.* Main Colliery Company." (83 *Law Times Reports*, 83; [1900] A.C. 85.)
b. "Wright *v.* John Bagnall and Sons." (82 L.T.R., 346; [1900] 2 Q.B., 240.)
c. "Hensey *v.* White," "Lloyd *v.* Sugg and Co.," and "Walker *v.* Lilleshall Coal Company." (81 L.T.R., 767, 8 and 9; [1900] 2 Q.B.; 142.)
d. "Lysons *v.* Andrew Knowles and Sons, Limited." (82 L.T.R., 189; [1900] 1 Q.B., 780.)
e. "Attorney-General *v.* Merthyr Tydfil Union." (82 L.T.R., 662; [1900] 1 Ch. 516.)
f. 82 L.T.R., 503; [1900] 2 Q.B., 32.
g. 82 L.T.R., 293; [1900] 1 Ch., 843.

THE PROFITS OF COAL OWNERS.

Some time back we noted the profits that are being earned by certain colliery proprietors during this their harvest time. What the sum total of all these profits has actually been we shall never know, as the majority of the mines are in the hands of individuals, or of private companies who do not publish their accounts. But the reports of those concerns in which the public are interested, serve as a very good indication of how coal-owners generally are faring. A recent issue of the "Economist"

contained an article giving some account of the profits earned by several of the principal colliery companies; and from this article we take the following particulars to supplement those previously given.

The great North-country firm of Pease and Partners was only turned into a public Company two years ago, with a share capital of £1,000,000, and debenture stock to the amount of £400,000. Those who subscribed the capital have reason to think themselves fortunate indeed, seeing that the profits for the year ended June 30 last (after writing off £15,600 for depreciation of leaseholds) amounted to no less than £350,919. That is to say that, after deducting £16,000 for interest on debentures, there remained a profit divisable among the shareholders equal to 33½ per cent. on their capital. With a prudent thought for the future—these halycon days they well know cannot last for ever—the Directors have only paid a dividend of 20 per cent., putting £100,000 to reserve and £20,000 to other purposes, and carrying forward a balance to the next account. Another report—that of the Rhymney Iron Company, which is now, however, mainly a coal-owning concern—shows a profit of £111,498, "by far the largest ever earned by the Company." The percentage of profit to share capital in this case is, however, only about 11½ per cent., over 5 per cent. of which has been carried to the reserve, depreciation, and debenture redemption funds. The Main Colliery, like Pease and Partners, have done much better than the Rhymney Company—earning 41½ per cent. on their share capital. They also have put by a nice little nest-egg for sustenance in the days to come, when "coal famines" shall be but a cherished memory. Over 20 per cent. on capital has been taken from the aforesaid profits and added to various reserve funds. The Fife Coal Company do not publish accounts, but give sufficient evidence of prosperity by paying a half-year's dividend at the rate of 50 per cent. per annum, which is a rate equal to the aggregate of that paid during the three preceding years. In other words, shareholders—if the present half year should yield a dividend equal to that for the past six months—will have received back the whole of their capital in four years, while still holding shares of a present market value four times as great as that at which they were originally issued.

We have heard a great deal of late about the "lean" times when coal mines have to be worked at a loss (that being a less evil than ceasing to work them altogether), and there have doubtless been such periods in the history of the coal trade. But, with the figures quoted at hand for reference, we shall feel little disposed to extend much sympathy to coal-owners when those times come again, as come they will, and that all the sooner because the advantage which the sellers have had over the buyers of coal this past year has been pressed to its extremity. To the investor, we should say, "Buy gas shares now, and coal shares two years hence; if you then hold on to both, you will always be sure of a good return from one or the other."

GAS AND WATER INTERESTS IN THE NEW PARLIAMENT.

As the main object of the General Election, in the throes of which the United Kingdom now finds itself, is to elicit a definite expression of opinion by the country on the South African policy of the Government, internal and purely domestic subjects have not figured very prominently in the addresses circulated or the speeches delivered either by the members of the late Parliament or by those seeking a place in the new one. Although overshadowed by the larger questions at issue, those bearing upon the administration of home affairs have nevertheless been in evidence; and among them has figured that of the municipalization of gas and water undertakings. It may therefore be of interest to note how the welfare of these concerns is likely to be affected by the results of the elections, so far as they have been published.

It may be supposed that the question of the gas supply of the Metropolis will possess special attractions to the returned members of the Powers of Charge Committee of last year; but of the fifteen gentlemen who constituted that Committee, five—viz., Messrs. Brynmor Jones, Gilliat, Lowles, Pickersgill, and Steadman—have lost their seats. Of the others—viz., Messrs. Abraham, Baldwin, Banbury, Cohen, Lough, and Pirie, Sir J. Rankin (Chairman), and Sir F. Dixon-Hartland—have been returned, and Mr. Lough has already expressed his intention of not letting the gas question drop. The only really gas engineering member of the late Parliament, as far as we are aware—Mr. D. Ford Goddard—has not forfeited the confidence of the electors of Ipswich, with which town and its gas-works he has been associated all his life, and whose Chief Magistrate both he and his father have been. It is perhaps going too far to say that in the new Parliament he will have a professional colleague in Colonel Sadler, who has been successful in securing a majority of the suffrages of the electors of Middlesbrough. Seeing, however, that he is an associate member of the North of England Gas Managers' Association, and was President of that body in 1894, he may be said to be in close touch with the gas industry. He has deprived the borough of the services of Mr. J. Havelock Wilson, who will have more leisure to devote to his compeers of the sea; but when it is borne in mind that the new member is a large manufacturing chemist and coalowner, and has for nearly thirty years filled the positions of Councillor, Alderman, and Mayor, is a Magistrate for Middlesbrough, the County of Durham, and the North Riding of Yorkshire, and also a member of the River Tees Commission, we think it will be acknowledged that he is eminently fitted to watch the interests of his borough and of the nation at St. Stephen's. Moreover, he is an ardent Volunteer, and possesses a highly genial temperament. Another new member connected with the gas industry is Mr. W. R. Plummer, who last week had such brilliant success at Newcastle-on-Tyne; getting in at the top of the poll. He is a Director of the Newcastle Gas Company, a member of the Corporation, and a very active man in the borough. As a large employer of labour in connection with both gas and water undertakings, we are gratified to find that Mr. John Aird will continue to represent North Paddington in the new Parliament. Mr. J. E. Spencer, of Wednesbury, retains his seat for West Bromwich. Sir James Joicey, Bart., the great North Country coal owner, has not been deprived of his seat for the Chester-le-Street Division of Durham by the Conservative candidate (Captain Nicholson), who polled only 5391 votes, against 5830 secured by Sir James.

With regard to water supply, Mr. E. Boulnois, the Chairman of the West Middlesex Water Company, and of the Staines Reservoirs Joint Committee, retains his seat for East Marylebone; and Lieut.-Col. Lockwood, who occupies a similar position in the East London Company, has been elected for West Essex. As Chairman of the Thames Conservancy Board, the unopposed return of Sir F. Dixon-Hartland for Uxbridge retains at Westminster a gentleman who is especially interested in the future of the London Water Supply. The London County Council have sought to increase their strength in the new Parliament; but have been unsuccessful. Mr. W. H. Dickinson, who has been Chairman of the Council and of the Water Committee, was unable, though he tried very hard, to shake the confidence of the electors of North St. Pancras in Mr. E. R. P. Moon, who is very popular, and who polled a majority of 711 votes; nor was Mr. T. M'Kinnon Wood, a prominent and active member of the Council, more fortunate in the St. Rollox district of Glasgow, although his opponent only counted 183 more votes. In addition to failing to secure these two seats, the Council have lost two in the Metropolis. Mr. Stuart has been superseded in Hoxton by the Hon. C. G. Hay; and Mr. Steadman at Stepney, by Major W. E. Gordon. Mr. Stuart's defeat is a distinct misfortune to the Council, as he was their spokesman at Westminster and took charge of their Bills; and, on the whole, it must be acknowledged that he was well qualified for the duty. Mr. Burns has come off better at Battersea; so that the Progressives on the Council will not lack a representative. As bearing upon the London Water Question, we note that the Hon. W. F. D. Smith (Strand), the first member elected to serve in the new Parliament, agrees with the conclusion of the report of the Royal Commission, and thinks the water undertakings should be transferred to a public authority.

Other names with which readers of the "JOURNAL" are familiar have been more or less prominent in connection with the election. Mr. Will Thorne, the General Secretary of the Gas Workers' Union, put up for West Ham, in opposition to Major Banes; but the electors would not have him. Mr. Keir Hardie, the Secretary of the Miners' Union, and a prominent Labour member, failed at Preston, but managed to get in for Merthyr Tydfil. Mr. A. D. Provand, who has lately taken up the coal question, with the view of having a Royal Commission appointed, will no longer represent the Blackfriars division of Glasgow; and Mr. Geoffrey Drage, the Secretary of the Labour Commission, has lost his seat for Derby. On the other hand, Mr. W. R. Bousfield, Q.C., whose name has lately been much before our readers in connection with the incandescent gaslight litigation, has been again returned for North Hackney, with a majority of 2568 over his Radical opponent.

PERSONAL.

Mr. J. B. TERRACE, of Brechin, has resigned the post of Manager of the Gas Company there, which he has held for many years.

Mr. J. A. KELMAN has resigned the secretaryship of the Gas, Water, and General Investment Trust, Limited, and accepted a seat upon the Board.

In our account last week of the visit of the Society of Engineers to Beckton, an incidental reference was made to the long association with the Society of Mr. PERRY F. NURSEY. That connection has extended to a longer period than we then imagined, although we were aware, from our own knowledge, that many years must have passed since it commenced. We learn that last Friday Mr. Nursey reached his seventieth year, and his forty-second year in the service of the Society, in one capacity or another. It has been, as he himself says, "an unintermittent service of pleasure."

Mr. SIDNEY EVANCE STEVENSON has been selected to fill the position of Engineer and Manager of the Devonport Gas Company, in succession to Mr. Richard Clark, whose death was announced in the "JOURNAL" for the 25th ult. We understand that there were 71 candidates for the appointment, in response to the invitation which appeared in our columns. Mr. Stevenson had arranged to take up his duties yesterday. He will bring to the discharge of them wide and varied experience acquired in this and other lands during the past twenty-five years, as

well as the prestige which the name he bears carries with it. Shortly after his admission to the British Association of Gas Managers, in 1877, Mr. Stevenson was engaged at the Exeter Gas-Works, where he remained for about four years. He then moved to Lincoln, and subsequently, in 1884, to Colchester, where he filled the position of Engineer and Manager of the Gas Company. In March, 1889, he left England for Canada, to take charge of the Montreal Gas-Works; but he returned at the expiration of five years to proceed to South Africa as Manager of the Cape Town and District Gas Company. This appointment he relinquished early in the present year, and left the Cape for England on the 31st of May; his successor being Mr. E. P. Reilly, of Guildford. We offer our cordial congratulations to Mr. Stevenson on being once more in a position to exercise his abilities as a Gas Engineer, and to the Directors of the undertaking who have secured his co-operation in carrying out the technical details of its management.

OBITUARY.

The death is announced of Mr. J. F. Wileman, the Chairman of the Staffordshire Potteries Water Company. Deceased was an Alderman of the Staffordshire County Council, and had been on the Commission of Peace for Staffordshire since April, 1876.

We record, with sincere regret, the death, on the 3rd inst., at the advanced age of 82, of Matilda, the wife of Dr. W. Pole, F.R.S., for many years one of the Metropolitan Gas Referees. The deceased lady was the daughter of the late Rev. Henry Gauntlett, Vicar of Olney, Bucks.

One of the veterans of the gas profession passed away last Thursday in the person of Mr. Bartholomew Gay Venner, who had been Engineer and Manager of the Eton Gas-Works for a period of 45 years. Deceased was one of the earliest members of the British Association of Gas Managers, having joined it in 1869; and his connection therewith was severed only two years ago. Deceased was in his eightieth year.

Mr. John Baird, the venerable Chairman of the Brompton, Chatham, &c., Water-Works Company, died last Wednesday morning at his residence, Deskfoord Cottage, Gillingham, at the age of ninety years. Mr. Baird was one of the founders and original Directors of the Company, which was formerly known as the Brompton and Gillingham Consumers' Water-Works Company, and was established in 1856 to provide water for Old Brompton and the neighbourhood. In 1860 the Company was incorporated by Act of Parliament, and the area extended so as to include Chatham and Rochester. Mr. Baird had been Chairman of the Company continuously since 1866, and had always taken a keen interest in its progress—being almost a constant visitor at the offices and works. Mr. Baird was High Constable of Gillingham on two occasions, and for about 25 years Chairman of the Medway Board of Guardians.

News of the death, last Tuesday, at the age of 52, of Mr. Charles H. Bingham, a prominent citizen of Sheffield, came with a shock of painful surprise to the whole city when published the next morning. The sad event calls for notice in our columns from the fact that some years ago Mr. Bingham's name figured rather prominently therein in connection with his dispute with the Sheffield Water Company on the question of the supply of water to baths. In the test case which arose out of the dispute, the Company claimed a declaration that they were not bound to supply water for private baths except on the terms of the consumer providing, at his own expense, a meter or other automatic self-registering instrument for the accurate measurement of the water used. The Court decided in their favour; but Mr. Bingham's action resulted in the Company's scale for baths being reduced by about 50 per cent. Deceased, who was one of the heads of the firm of Messrs. Walker and Hall, was elected Master Cutler in 1894.

Injecting Cement with Compressed Air.—Injections of cement have long been employed for stopping cracks in masonry; but the operation has been performed from the surface to the inside. The "Annales des Ponts et Chaussées" mentions the following method devised by M. Caméré, who works the reverse way. He makes vertical channels in the new masonry, 12 centimetres in diameter, into which cement is injected by the aid of air under a pressure of 1 kilogramme per cubic centimetre. The system can, it is stated, be applied for the consolidation of masonry in bad condition.

The Welsbach Company's New Price List.—We have received from the Welsbach Incandescent Gas-Light Company, Limited, their catalogue for the forthcoming season. It furnishes evidence of the ability of the Company to offer to the public a large variety of burners, mantles, globes and shades, pendants, and other accessories of incandescent gas lighting. In addition to the illustrated particulars relating to the above articles, comparisons are made between the cost of incandescent, ordinary, and electric lighting, by which the economy of the first-named system is abundantly proved. The catalogue is specially valuable to gas managers, as it not only supplies them with examples of the latest types of appliances used in connection with the incandescent system, but also with figures by which they may easily demonstrate to their consumers the advantages resulting from its adoption.

COMMUNICATED ARTICLE.

PRACTICAL NOTES ON GAS MANUFACTURE.

By S. Carpenter, of East Ham.

(*Continued from p.* 836.)

Testing and Test-Papers.

It is necessary that the gas should be tested for sulphuretted hydrogen and carbonic acid at the inlet and outlet of the scrubbers. The instrument employed is the eudiometer; and the process is as follows: Take a portion of the gas into the eudiometer, add a solution of acetate of lead, and well shake it up with the gas. Put the eudiometer in water, and let it remain there for three minutes; then take it out, and read off the amount of absorption, which will give the percentage of sulphuretted hydrogen. Add a few drops of a strong solution of caustic potash to the gas, and shake well; then stand the eudiometer in water for three minutes, and read off the absorption, which will give the percentage of carbonic acid. The test at the outlet of the scrubbers will show the percentage of impurities taken out of the gas by the water in these vessels. At the same time the gas should be tested at this point with red litmus paper, to see if there is any ammonia in it. If there should be, the paper will turn blue. Then examine the scrubbers, and see if they are working properly. Before passing into the lime purifiers, the crude gas should be tested for bisulphide of carbon. Prior to this operation, it should be sent through a small purifier charged with oxide of iron, to remove the sulphuretted hydrogen. It should likewise be tested for carbonic acid and bisulphide of carbon at the inlet and outlet of the first lime purifier; and the difference between the two testings will give the percentage of the latter impurity which has been taken out by the lime. There should be a lime-water test for carbonic acid in the middle and at the outlet of the purifier. If the water becomes milky, carbonic acid is present. The gas at the outlet of the second lime purifier should be tested for bisulphide of carbon in the same manner as the first. This will give the percentage of bisulphide in the gas at the outlet of the second lime purifier.

When the bisulphide of carbon is as high at the outlet as it is at the inlet of the first purifier, or if carbonic acid should make its appearance at the outlet, the vessel should be thrown out of action. If the crude gas is allowed to act upon the foul lime, a newly-formed impurity, called sulpho-carbonic acid, will appear, and the quantity of sulphur will be very great. It will not only give high sulphur results at the outlet of the first purifier, but will interfere with the lime in the second. The writer's experience is that when the sulphur at the former point is as high as it is at the inlet, that purifier should be thrown out of action, and the second vessel made the first—a clean lime purifier being put on for the second. The gas should be tested for sulphur at the outlet of the second purifier.

From the outlet of the lime purifiers, the gas should be passed through a series of vessels charged with oxide of iron, for the purpose of taking out the remaining sulphuretted hydrogen. About 1½ to 2 per cent. of atmospheric air should be passed into the first oxide purifier with the gas. This will keep in an active state the oxide of iron, which will purify much more gas. The gas at the outlets of the oxide purifiers should be tested twice a day for sulphuretted hydrogen, and once at the outlet of the last oxide purifier for bisulphide of carbon. It is an excellent plan to have a test for the former impurity on the outlet of each oxide purifier. This can be easily done by taking a piece of glass tube, an inch in diameter, inserting a strip of paper saturated with a solution of acetate of lead, and passing about a cubic foot of gas per hour through it.

To prepare the lime water for testing gas, take a gallon of water, and drop into it about 4 oz. of quicklime. After it is dissolved, decant the clear fluid, then filter it, and put it into a glass bottle. It will then be ready for use when required. To prepare the test-papers for sulphuretted hydrogen, add one part of sugar of lead to eight parts of water, and when the lead is dissolved, moisten some sheets of bibulous paper with the solution. Let them dry, then cut them into small strips, and put them into a glass bottle, ready for use. Blue litmus papers are made by taking a solution of blue litmus, and a few drops of very dilute sulphuric acid, and saturating some paper with the solution to such an extent as to leave it slightly red when dry. Cut it into small strips, and put them into a dark glass bottle, when they will be ready for use.

To test gas for carbonic acid, take a small quantity of the lime water in a beaker. If there should be any carbonic acid present, the lime water will become milky. When testing for ammonia, the red paper will become blue if there should be any of this impurity. When testing for sulphuretted hydrogen, its presence will be shown by the white paper turning a dark brown. On testing for bisulphide of carbon, the Gas Referees' sulphur test should be used.

The Manipulation of Lime in Purification.

It appears that at present hydrate of lime used dry is the most effectual, economical, and least hurtful agent to which impure gas can be subjected. No practical man will venture to deny (in fact, those who are best acquainted with purification

will be the first to declare unanimously) that lime is the only substance which will effectually remove the chief impurities of coal gas without causing so serious a lowering of its illuminating power as to require the introduction of a new element in the calculation of the cost—that is to say, the employment of cannel coal, by way of compensating for the loss caused by other purifying agents than lime. In the preparation of this valuable purifying material, take a bushel of quicklime (commonly called "unslaked" lime), properly burnt from good chalk, and weigh it. Its weight should be from 56 lbs. to 60 lbs.; if it is more than from 58 lbs. to 62 lbs.—say, from 66 lbs. to 68 lbs.—the chalk has not been properly burnt, or it may have been of inferior quality. Spread out the lime, and water it. It will take from 4 to about 5 gallons of water to slake a bushel. After it is well slaked and mixed, a bushel should weigh from 32 lbs. to 34 lbs. Take a handful and squeeze it; and if it adheres, it will be the required consistency, and fit for the purifier. Then slake a yard of the same lime, which will take from 85 to 90 gallons of water. In slaking, spread the lime on the floor in a layer about 6 inches thick and about 10 feet square; then water it, and put on another layer, treating it in the same way. Continue doing this until the lime is about 4 feet high, and let it remain until it is thoroughly slaked. Then turn it over, and well mix it. Good lime is soft to the hand; if when slaked it has a sandy feeling, is not good for purification purposes.

(To be continued.)

NOTES.

The Softening of Feed-Water.

Mr. J. A. F. Aspinall has given a paper to the International Railway Congress descriptive of the various means adopted by a number of Railway Companies for softening the feed-water supplied to their locomotives. How important this matter is to steam-users on a large scale, need not be emphasized. In the Argentine, a water supply of 25° of hardness, chiefly temporary, is reduced to 9·8° of hardness by the use of the Tyacke apparatus. This process consists in the rated addition of quicklime and caustic soda to the water. The Southern of Austria railway uses the Beranger and Stingl apparatus; the reagents being milk of lime and soda, with subsequent filtration. A hardness of 44·64° is thus reduced to 11·7 per cent. Very much the same appliance is used by the French State railways. On the Eastern of France, if the hardness does not exceed 35°, soda alone is used. If over this, milk of lime is added to separate the bicarbonate of lime. The London and North-Western Railway use the modified Clark process, reducing the total scale-forming matter from 19·5 to 3·1, and the total hardness to 3·6°. The Midland Railway employ the Archbutt-Deeley process, which is a rapid and economical one, reducing the total scale-forming matter from 13·16 to 2·68. Some Austrian and Russian lines use petroleum, for the sake of its mechanical action, which prevents the adhesion of the precipitated matter by coating every particle with a skin of oil.

Coke Fired Motor-Vans Successful.

It has been stated, and the statement has been widely circulated, that the experience of the Chiswick Sanitary Authority is unfavourable to the use of motor-vans for dust collection. Mr. E. Shrapnell Smith has given the Association of Cleansing Superintendents of Great Britain, meeting at Salford, a different view of the matter. He criticizes the Chiswick returns, and sets against these some encouraging figures supplied by Mr. Arthur Ventris, the Engineer and Surveyor to the Strand Board of Works, whose smart-looking motor dust and watering vans are well-known objects of the streets lying between Covent Garden and the River Thames. A saving per annum of £173 per motor is claimed for these machines, for which perhaps the excellent organization of the work is partly responsible. It is agreed, moreover, that steam is the only mechanical power within the range of practical politics, and that solid fuel—coke for choice—is more economical than oil fuel. The machines are high priced; but their working capacity is declared to be in proportion. It should not be overlooked, however, that the Strand vehicles scarcely ever go off wood pavement. The rules for the economical employment of motor dust and water vans are: The concentration of sufficient men upon it to allow of its large capacity being fully utilized; the prompt execution of repairs, and periodical tightening of the wheels by a hydraulic tire-setting implement; the working of the motor two shifts a day. After all, these rules only mean that a motor-van, like any other labour-saving device, requires to be driven to its fullest capacity to pay.

A Cheery View of the National Coal Resources.

In his Inaugural Address as President of the National Association of Colliery Managers, Mr. Rhodes touched upon the lugubrious statements that have been made from time to time with regard to the approaching exhaustion of the British coal-fields. Mr. Rhodes did not take this pessimistic view of the question. He particularly objected to the proposed restriction or total stoppage of the export of British coal, declaring that such a suggestion will never be entertained, except possibly with regard to the Welsh smokeless steam coal. This, being limited in quantity and invaluable for naval purposes, should be bought up by the nation. But to put a stop to or any limit on the exportation of coal generally would mean reducing the means of livelihood of 600,000 coal miners and their families, which would entail the immediate interference with the means of support of 3,000,000 of the industrial population. Quite apart from the consideration that it is possible to think too much of posterity, Mr. Rhodes holds the opinion that the coal resources of the country are very, very much greater than is generally supposed. While it is true that a calculation which it is easy to make will show that, at the present rate of production, the best seams will be exhausted in from 200 to 300 years, yet there are a large number of seams of coal in reserve which can be worked under very much more favourable conditions than the seams actually being got in Belgium and France. These seams will undoubtedly come into use when the better ones are exhausted. In normal times, they cannot be worked in competition with the better-class seams, because a difference of a shilling a ton in working cost would be prohibitory. But it is an undoubted fact that there are seams which will be available, and will be worked for many hundreds of years after such seams as those of the Barnsley bed are exhausted. This declaration of opinion was very warmly applauded by the meeting.

A New Liquid Fuel Burner.

Mr. G. Denis has reported in the "Petroleum Review" on the working of the Peterson-Swensson patent liquid fuel apparatus. This is an appliance for burning liquid fuel, for steam raising, in a way that substantially differs from the ordinary, by pulverizing the fluid by pressure only. Most atomizers, as is well known, work by steam or air injection, to both of which there are grave objections. The appliance now in question comprises a strong copper cylinder, through which the controlling needle passes centrally, finished off at the head with a steel cap having a central hole for the oil spray, and provided with a side pipe connection for admitting the oil from the pump. That is nearly the whole of the arrangement, besides the usual accessories of boiler-furnace attachments, and so forth, which are not peculiar to it. One speciality, however, is an adjustable grooved screen fixed in front of the outlet for the oil-jet, and inclined upward at an angle of 45°. This is relied upon to form the spray for ignition in the furnace. The oil is pumped into the apparatus by a small Worthington steam-pump with 3 inch steam and 1⅛-inch oil cylinders. It is delivered at a pressure of 200 lbs.; and the spray is stated to account for 25 gallons of oil per hour. Two or more sprays can be fitted into a Cornish boiler furnace lined with fire-bricks at the point of ignition, and for a distance of about 8 feet inwards. This lining soon gets white hot, materially assisting the rapid and complete combustion of the oil. There should be a fire-brick bridge at the end of the chamber; and the oil should be preheated by the exhaust. In a test cited in detail, the equivalent evaporative duty of the oil was about 12½ lbs. per pound of fuel. The expense of the apparatus is represented by the quantity of steam used in working the oil-pumps, which is returned as averaging 0·31 per cent. of the total generated, or 0·039 lb. per pound of fuel treated. Natural chimney draught was used, at from 8 to 10 millimetres vacuum. There is no noise; and the air regulation showed a theoretical excess of 36 per cent., which is about right for the best working with liquid fuel.

Xylozited Timber.

A process of preserving timber has been brought under our notice by the Xylosite Company, who have works at Pitlake, Croydon. It is claimed for the process that it increases the life of all timbers, especially soft woods, without any of the consequential disadvantages of the most successful older preserving processes, such as creosoting. The treatment does not discolour the wood, leaves it odourless, and reduces its inflammability to a minimum. It is due to the study and perseverance of Mr. Fritz Hasselmann, a German engineer and architect, and consists essentially in boiling the timber in a saline solution under moderate pressure. The impregnating materials are the sulphates of copper and iron, crystallized together in the proportions of 20 per cent. of copper and 80 per cent. of iron, with alumina and "kainit"—a commodity hitherto only known to commerce as a manure. The proportions of the salts in the preserving bath, its temperature, the time of boiling, and so on, are adjusted to the requirements of the sample of wood to be treated. It is an understood fact that the salts of iron and copper will preserve timber, provided they can be thoroughly and evenly distributed throughout it, and kept there. Both these necessary conditions are stated to be fulfilled by the process. The sap is dissolved and carried off in the liquid bath—the copper destroying all putrefactive germs; and the iron remaining in chemical combination with the cellulose, or nature of the timber, which is insoluble in water. The metallic salts are not mechanically deposited by the evaporation of the liquid that previously held them in solution; nor do they recrystallize in the cells and sap-ducts of the wood. A microscopical examination of the treated wood shows the cells and sap-ducts to be perfectly free of crystals; while the presence of iron throughout the timber can be demonstrated by the usual simple chemical tests. The efficacy of the Hasselmann process is certified by Dr. Roesler, of the Imperial and Royal Testing Establishment, Klosterneuburg; and it has been largely adopted for the South German Railways. Xylozited wood is claimed to be a complete answer to the request contained in a "Note" published in the "JOURNAL" for Aug. 28.

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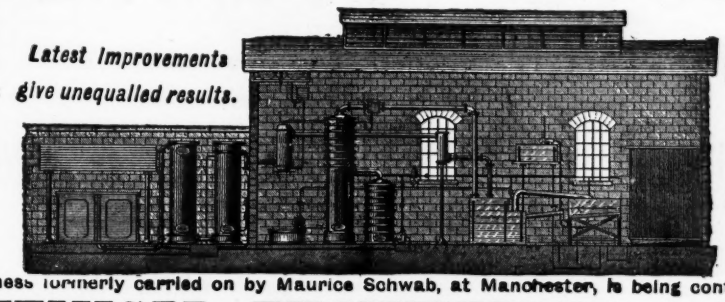

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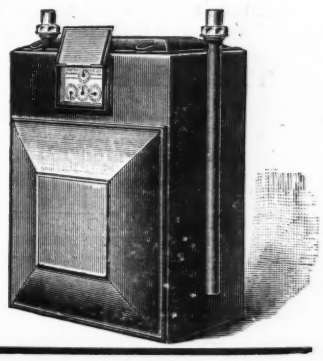

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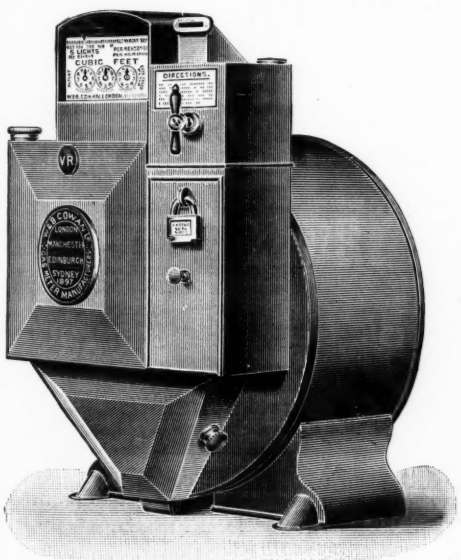

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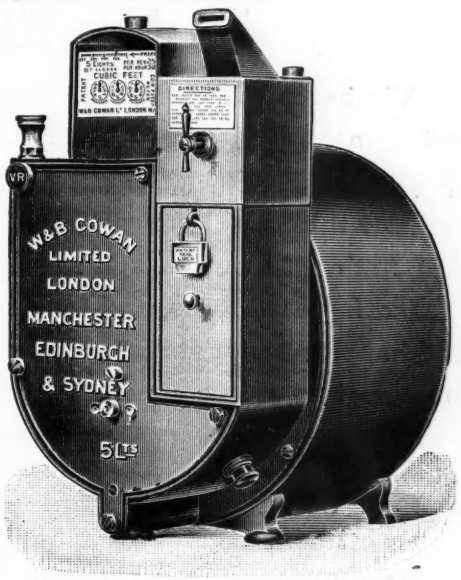

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THE INTERNATIONAL GAS CONGRESS.

METHODS FOR GIVING STOKERS AN INTEREST IN THEIR WORK.

By I. Hedde, of Paris.

[A Paper read before the International Gas Congress in Paris.]

(*Concluded from p.* 842.)

II.—Provident Institutions.

No man who has had the management of workpeople for any length of time will dispute the fact that the tramp who lives from hand to mouth, and only stops on his way to find his daily bread as best he can, does not do such good work as the workman who has been made steady and economical, thanks to the provident assistance of the employer. The tramp only looks for the immediate wages which enable him to meet the needs of the day. He cares nothing for good workmanship and the prosperity of the works. He is generally miserable; and, as poverty is a bad councillor, he is, as a rule, hostile to the master, with whom he has never had any relations beyond receiving wages in exchange for labour. Payment, he considers, cancels all obligations; though, in most cases, the workman stigmatizes the master as a fraud. The permanent economical workman, on the contrary, who is, of course, temperate, preserves his physical strength better, studies his master who takes an interest in him, and endeavours to do his work as well as possible so as to give satisfaction. He sees his lot improved by economy; and, encouraged by the certainty of his next day's bread, he will perform his task with so much greater spirit. It is not then from a purely sentimental and philanthropic point of view that provident institutions should be considered, but also as the most reliable means of forming a really devoted and capable staff at the works.

Among these provident institutions, I shall merely mention those for gratuitous or cheap lodgings, savings banks, sickness, and old-age pensions—insurance against accidents having been dealt with by the law of April 9, 1898. However, even if people generally agree as regards the advantages of provident institutions, opinions are various on the question as to the possibility of all works adopting them, and the best means to employ.

I shall begin—thus completing the above inquiry—by recalling the schemes which have been established by two companies whose names I can mention, as the documents supplied to me have been published—viz., the Paris Gas Company and the Mans Gas Company.

Paris Gas Company—Stokers' Wages and Premiums.

1. The retort-house hands (stokers, luters, &c.) are paid by the piece, at the rate of 3·30 frs. per metric ton of coal carbonized (the charge is more or less great according to the degree of heat of the furnaces). The three stokers also receive a premium of 0·50 fr. for the scoop-handle holder and 0·25 fr. each for the two others. The men who wheel the coals and coke do not form part of the furnace staff, and receive fixed wages.

2. All the workmen are given a premium, in kind, in addition to their wages—viz., 4 hectolitres of coke per month in winter, and 2 hectolitres per month in summer.

3. At the end of each term they also receive a share in the profits of the Company, representing more than 0·30 fr. per day of work.

4. The furnace men pay 0·07 fr. into the provident funds per day; and when sick they receive a daily allowance of 3·50 frs., and also medical and other necessary attendance.

5. Workmen who are recommended by the position of their family, and the time and nature of their services, receive from the Company a supplemental allowance equal to that from the provident funds.

6. Workmen have the privilege of depositing their savings to the extent of 500 frs. in the savings bank, for which interest at the rate of 5 per cent. is paid.

7. Without making any deductions, the Company accord pensions of 600, 700, and 800 frs. after 25, 30, and 35 years' service—the age of the workmen being at least 55, except in the case of a workman incapacitated by infirmity.

The widows and young children of pensioners receive one-third of the pension paid to the workman, provided that the widow married at least ten years before retirement of her husband, and that the orphans have no mother, or if she is unfit to receive the pension.

The report for the year 1899 gives the following details regarding the working of these banks.

Provident Bank.—It is supported by a deduction of 1 per cent. from the attendance tickets of the Directors, from the salaries and wages paid, and by an equal subsidy from the Company.

The expenses for the year 1899 were 555,994 frs. The excess of expenses over receipts has been debited to the works' accounts.

Savings Bank.—The object is to facilitate, without expense or loss of time, the investing of savings from wages, and pay an interest of 5 per cent. On Dec. 31, 1899, the deposits of the employees and workmen amounted to 290,486·21 frs.

Pensions Fund.—In 1899, the following sums were paid by the works: 1. For old-age pensions granted since Jan. 1, 1893 (the starting point of the working of the funds), 112,170·96 frs. 2. For the annual renewable relief money granted before Jan. 1, 1893, 31,371·51 frs.—a total of 143,542·47 frs. To provide the capital necessary to pay the pensions after Dec. 31, 1905 (the date of the end of the concession), the sum of 121,721·44 frs. has been charged to the works' accounts.

Mans and Vendôme Gas Company.

Wages.—Stokers receive fixed wages, in addition to which those at the Mans works who attend to the regenerative furnaces receive a premium of 0·75 fr. In order to remunerate the extra labour due to the increase in the number of charges, each stoker is awarded a daily premium varying from 0·25 to 0·75 fr. The total of the premiums may amount to 273·75 frs. for each stoker. During the periods of military instruction, the chief workmen receive full pay; the others, half pay if bachelors or widowers without children, and full pay if married or widowers with children.

Stoking.—The following monthly allowances are made to each workman: 3 hectolitres of coke during the six winter months, and 2 hectolitres during the rest of the year.

Participation in Profits.—The staff employed (foremen and workmen) receive 5 per cent. of the net profits after deduction of the prescribed sums for the formation of the reserve funds, and the amount required for paying the shareholders a first dividend of 5 per cent. The money is divided among the men proportionally with the year's salaries and wages; and the amount due to each is paid into the savings bank and entered into a special book.

Sick Funds.—A sick workman is attended to at the expense of the Company. He receives half his wages all the time he is ill; and, if he dies, he is buried at the Company's expense.

Assistance for Children.—In 1878, the Company gave each of the workmen's children an old-age pensions fund-book with an entry of 20 frs. Since then the workmen pay annually to the credit of each child a minimum sum of 10 frs. until the child is old enough to earn its living. The Company pay an equal amount for the benefit of each child. The payments are made out of the reserved capital.

Pensions.—Since 1899, the Company have replaced the gratuity pass-book by a system of pensions without any deduction from the wages. The amount paid at Dec. 31, 1899, for pensions to 73 old workmen was 104·26 frs. each, and also 4604·66 frs. was credited to 34 old workmen who have retained their gratuity pass-books. At the end of each year, the Company pay to the National Old-Age Pension Fund, on the individual pass-book of each participant, 8 per cent. of his wages, if he has been at least one year in the works, and 10 per cent. for ten years' service. The age at which the old-age pension is payable was fixed at 57 years. In the event of the Company abandoning the works, they would also stop payment. These institutions represent an expenditure by the Company of about 30 per cent. of the total wages. Some workmen have secured a patrimony for their children, and there has never been any stoppage of work or a strike—the understanding being perfect between the Administration who give such tokens of solicitude for the employees and the workmen who in return do not spare their zeal.

III.—Discussion of the Means Indicated and Proposed Solution.

Premiums on Work.

The inquiry which forms the first part of this essay demonstrates that premiums on manufacture are paid with success in a number of works, while in others, on the contrary, they gave no results. Application of the system, in fact, depends upon complicated factors, the chief of which are:

Size of Works.—In large establishments, where the system of work is by the piece, the individual premium on the coal carbonized has no reason for existence; and the total premium on the gas is so much the less efficacious as the number of settings, the production of which is registered by one station-meter, is greater. Only the foremen or furnace superintendents can have any interest in the yield of gas. It is in average-sized works that premiums on manufacture are most common. The results will be so much the better according as the service of the settings is better organized with a view to premiums and as the manager makes the stokers clearly understand the advantages; and finally according as he verifies that the premiums, have been accurately calculated and that the stokers have been rightly informed. In small works, where supervision and inspection do not exist, nor even, very often, the weighing of the charges of coal, only simple premiums can be applied which do not require calculation or settled agreement; and yet even these are efficacious when judiciously applied like that mentioned in reply A.*

Type of Furnaces.—With regenerative furnaces, the temperature, which is the most important factor in gas-yields, does not depend upon the stoker, because the dampers are regulated by the retort-house foreman, who alone inspects and moves them. Consequently, premiums depending on the yield of gas seem more suitable for ordinary furnaces, in which the management of the fires requires less attention from the stoker than with regenerative furnaces.

Character of the Workmen.—In some places, the intelligent,

* See *ante*, p. 839.

industrious workmen will be stimulated by a premium; in others, stupid and indolent, they will not be influenced. Thus premiums generally give good results in the North and East. Replies L and N seem to indicate that it is not so elsewhere; and replies K and L clearly demonstrate this difference of local temperament. I would make the following observations regarding the various systems of premiums.

The Premium for Assiduity is universal, and everywhere gives good results. It is just, because the stoker becomes more valuable the longer he remains in the works; and if later his value remains stationary or commences to decrease, it is an encouragement to permanent work and a recompense for services rendered.

Premium on Coal Carbonized, which really is only paying by the piece, justly remunerates the workman for his extra labour. It has the advantage of being individual, and easy to apply; but it has the inconvenience of inducing the stoker to put the greatest amount of coal possible into the retorts. It must therefore be supported by strict supervision by the foreman, so as to reduce the charges according to the temperature of the furnace, and inflict fines for retorts not properly worked off.

Premium on Gas Manufactured is given either for the total production or the amount in excess of a fixed quantity, according to the type of furnace, kind of coal, &c. This premium, which has the drawback of not being individual, and depending on the kind of coal, is simple in application, and has the advantage of bearing directly upon the final result to be secured—viz., production of gas—and thus interesting the stoker in maintaining the temperature of the setting, and the good condition of the furnace and retorts, proper distribution of the charge, &c. Replies K and L give the application of the premium to the production of gas per retort above a fixed quantity, which has the advantage of encouraging the stoker to increase the charge, and consequently employ a minimum number of retorts. Reply K gives the fullest details regarding this premium, and demonstrates its advantage with wonderful precision.

Premium on the Yield of Gas is simple in application, and generally gives good results. Replies P and Q, it may be noticed, provide for the excess of yield detrimental to the illuminating power, also for the preservation of the furnace, and for consumption of fuel.

Premium on Economy of Fuel is not practised, at least directly. Consumption of fuel, in fact, depends upon several factors—draught, over which the stoker has no control; quality of fuel, often variable; and fireplaces, which when corroded consume more fuel than when new. Some of the preceding premiums indirectly include it—like the premium for amount of gas per retort, and that on the yield of gas within certain limits. Reply K deals with a direct premium based on the minimum proportion of coke called "*marron*" remaining in the ashes. But it is to be noted that this coke from screened ashes is utilized, and that the real loss is due to what is uselessly burnt by excess of air or to the dampers being opened too much, or currents of air through the joints in the settings. It is also to be observed that some works have realized economy of fuel by giving the stokers an interest in the work or employing poor, cheap fuel.

Provident Institutions.

As M. Fougerousse remarks in his work "Masters and Men of Paris," "the essential basis of provident institutions is, first, pecuniary sacrifice by the master, who takes, for the profit of his men, from the general expenses or profits of his enterprise an additional sum to what he legally owes them; secondly, the saving by the master for the benefit of the men. The resultant of these two forces is the possession of capital, constituting a patrimony for the workman." It is this principle which, with most praiseworthy generosity, the two above-mentioned Companies have adopted—viz., the Paris Gas Company and that of Mans. As regards provident institutions, I shall only discuss those regarding lodging, savings, sickness, and old age.

Lodging.—The lodging has a great moral influence on the workman. Generally, he has the most miserable lodgings—reducing his rent as much as possible—bad sanitary arrangements, overcrowding, and inconveniences of all kinds, which drive him from his home and family to the public-house. An excellent result, both from the physical and moral point of view (as also of good workmanship), is obtained by lodgings at the works or cheap workmen's dwellings, the rent of which includes purchase, by which an economical workman can become owner of the house he occupies after some years. Numbers of gas-works lodge their employees and head workmen, and some their best stokers. Thus the workman, has a home where he enjoys all the healthy recreation of life, and becomes settled. He oftener meets his master, who thus has greater facility for testifying his solicitude by visiting him when sick, &c., when a token of goodwill or assistance often creates everlasting gratitude.

Savings.—Long experience with labour in gas-works demonstrates that economy engenders order, temperance, and assiduity, and that an economical workman is always diligent and regular. The great difficulty for a workman in saving, is to put his first sou aside—not that he is ignorant of the benefits and necessity of saving; but before beginning, he is afraid of the privations he may have to endure, he becomes discouraged, procrastinates, and eventually abandons the idea. He needs some provident administration to protect him against his own weakness, encourage him by liberal advantages to save some little to begin, no matter how trifling, and if necessary compel him (later he will be the first to return thanks) by the rules of the works to put aside some of his wages to provide for sickness and old age. This first saving will lead to others which will be less and less difficult; and he will progress in this path, under the influence of habit and satisfaction, towards the object, which is the possession of capital or an income to assure the existence of himself and family at the time of slack work.

Savings Bank.—The system of deposit with liberty to withdraw, as practised by the savings bank, is evidently that which most respects the liberty and dignity of the man. But it presents a danger—viz., that, as soon as his capital has attained a certain figure, the workman may be led to leave the works, and risk his money in some transactions or trade of which he is ignorant; whereas, by reserving his savings in the provident fund or old-age pension, he provides against sickness during work and assures, according to his own expression, "bread on the board" for his old age.

Provident Fund.—As we have seen, the Mans Company meet the expenses for the sick fund without taking anything from the wages. Several companies supply their provident fund from the workmen's wages, and a generally equal subsidy from the company; but most, solely from the wages and fines. Here the author of this communication begs leave to mention a personal reminiscence: At the Angoulême Gas-Works, which he managed for 23 years, he established a mutual sick fund supported by retaining 1 fr. per month from the wages of each member, and the fines. At the beginning, membership was optional; and there were few members and little money. Seeing that the institution could not thus exist, he decided to make it obligatory, by the rules, for all the permanent employees—including the manager—to belong to the Society. This was accomplished without difficulty; and many of the workmen later expressed their thanks. This Provident Society has constantly supplied medical aid, with daily allowances varying from 1 fr. to 1·50 frs., according to the money in hand. The accounts were read to the workmen at an annual meeting presided over by the manager, who merely practised the precept given by the eminent M. Cheysson: "*Laisser faire et guider.*" Moreover, the workmen behaved with wisdom; changing their rules with great prudence, and preventing irregularities by mutual control. In fact, it was a question of their money and the existence of an institution the benefits of which they had appreciated. For many years there was no serious difficulty; and on his departure, the manager was greeted at the farewell meeting with unforgetable expressions of affection and gratitude.

Pension Fund.—This question was dealt with in a masterly manner at the Congresses of 1880 and 1881, by M. Leclerc; and at that of 1890, by M. du Pasquier. The discussions raised by these communications, and the unanimous approbation expressed by the President, M. Ellisen, demonstrated the keen interest taken in the question. Without returning to the calculations given—which would now require modification, owing to the fall in the rate of interest from 4 to 3½ per cent.—I shall merely mention the solutions proposed. M. Leclerc recommended the foundation of a single pension fund for gas-works which participated, with or without their employees. According to his estimates, 6 per cent. of the annual wages sufficed to give from the fund to each workman of 60 years of age, after 30 years' service, a pension equal to half his wages. To have the reversion at death for the widow and orphans, it was requisite during the first years to deduct more than 6 per cent. M. du Pasquier, recalling his difficulties in establishing this single fund (the chief of which was the liability of the fund to the persons insured in case of dismissal), proposed a system of individual insurance contracted by the works separately for each workman, with Assurance Companies, making the former participate in the old-age pension, with a loss of all rights in case of leaving or dismissal, at least during the first ten years. An exception was made for certain cases. For example, where a workman with more than ten or fifteen years' service was obliged to abandon stoking against his will, and without blame, in which case he retained his contract. Thus the gas-works would have to pay the assurance premium as long as the workman remained in their employ. This has the inconvenience of making the Assurance Company profit by all or part of the money paid. Gas companies hesitated to thus bind themselves, both on account of the amount they would have to pay and the uncertainty of future resources, as also the possibility of legal disputes with the companies or workmen. Must we then abandon the great advantages of the old-age pensions so well described by M. Leclerc? They certainly have the advantage of retaining the workman until the age for pensions; for they constitute a real premium for perseverance, and facilitate the finding and retaining of employees, assuring a better selection. They also attract and specialize reliable and devoted workmen—thus benefiting not only the employees, but also improving the working.

In the discussion which followed M. Pasquier's communication, M. Delahaye rightly remarked that there were strikes at Lyons in spite of the premiums—a proof that deferred pay does not prevent strikes. Messrs. du Pasquier, Ancet, and the President, M. Le Trenst, agreed that the pension system was the best means to attract the stoker. I believe one can obtain this permanency of engagement, so desirable for workman and master, and would call to mind the glowing words of Jules Simon:

Poor and soured by their poverty, ignorant and ashamed of their igno-

rance, the workmen always fear being deceived or exploited. Words cannot dispel their error; one must persuade them by the long and sure system of institutions.—"*L'Ouvrière.*"

We must then persevere in the study and improvement of these institutions, endeavouring to dispel as much as possible that mistrust natural to the workman, and develop to the fullest extent his individual initiative by aid of that marvellous instrument *interest by saving*. M. Cheysson writes as follows in the "*Institutions Patronales:*" "We value but little what costs no trouble, and accustom ourselves to regard favours as rights. Readily we admit that those who do good, do so only for their own interests. There is something yet worse when a kind of providence supplies all the workman's wants without requiring any labour on his part. Then he ceases to rely on himself, and loses all initiative and sense of dignity. To revive his initiative, and accustom him to rely on self more than his master, is preferable to that kind of guardianship which tends, through simple benevolence, to maintain the workman." Thus, in the case mentioned, of the sick fund of the Angoulême Gas-Works (to which the Company gave no subsidy), I am convinced that difficulties or abuses would have been greater if the Company had incurred all expenses.

Conformably with these principles, I would like to propose the following solution, based on the co-operation of wages and a voluntary pecuniary sacrifice of the company to constitute an old-age pension fund. In this scheme the workman alone would accumulate, by his savings in the National Old-Age Pension Fund, the capital requisite for an annuity. His pass-book is his private property, and follows him wherever he goes. The company only intervene to require or compel him to take this book, according as the regulations make it optional or obligatory—granting him a free allowance called "gratuity for improvement of pension." Every month the workman should pay so much per cent. to his account, and the company annually place to his credit in the account called "improvement of pensions" a voluntary gratuity fixed by the directors at the end of each year, having regard to the amount paid by the workmen and the resources of the company. This allowance would be divided among the workmen, reckoning their shares according to the number of their children and dependants. The amount would be entered in the account for "improvement of the pension" of each workman, and could not be paid out except as pension. In the case of a man voluntarily leaving the works or being dismissed, he would take away his pass-book as constituted by his wages, but forfeit the added allowances, which would then be put to the other accounts, except in special cases decided by the directors. This system presents the following advantages: 1. The workman's payments and those of the company are separate. 2. The company make no future engagement—everything being settled yearly—and there can be no litigation, as the regulations regarding dismissal, &c., are perfectly clear and just. 3. It applies to all works, large and small. It is very simple, and can be commenced gradually with the greatest ease. Every month, the total amount is sent with the pass-books and an account to the National Old-Age Pensions Bank, which enters it and returns the books.

Let me add that the pension pass-book system has been extensively adopted, particularly in the Orleans Railway Company's and it is that of the law of June 29, 1894, relating to sick fund; and pensions for mining workmen. An objection can be made—viz., that the workman has no perfect certainty of attaining a given age and pension; but the above remarks demonstrate that this is preferable for good work. A workman whose pension is assured may be grateful and zealous; but he will not feel the necessity of effort like one who accumulates it daily by optional or obligatory savings, and who is encouraged by the advantage accorded by the company to work harder to improve it. On the other hand, he will devote the more attention to the pension because it consists in part of his savings, value it more, and be more anxious to make new sacrifices to increase it.

In order to clearly explain the matter, let me suppose that the minimum percentage of wages to enter in the pass-book is 5 per cent. on an annual salary of 1500 frs. The following table gives, according to the rates of the National Old-Age Pensions Bank, the results of the various annuities at different ages, either with alienated or reserved capital:—

Age at First Payment.	Ages of Recipients of Life Annuities.					
	Alienated Capital.			Reserved Capital.		
	50 yrs.	55 yrs.	60 yrs.	50 yrs.	55 yrs	60 yrs.
25 yrs.	255 frs.	405 frs.	662 frs	160 frs.	250 frs.	400 frs.
30 ,,	182 ,,	300 ,,	498 ,,	110 ,,	175 ,,	286 ,,
35 ,,	123 ,,	213 ,,	365 ,,	71 ,,	120 ,,	199 ,,
40 ,,	75 ,,	142 ,,	258 ,,	41 ,,	75 ,,	132 ,,

If one supposes that the allowance of the company is equal to the wages-reserve, the above results will be double; and they demonstrate that a stoker who begins working at 25 years will at 60 have a pension of 800 frs. reserved capital. At the present time, stokers with 35 years' service are few; but I think this number would augment with the permanency of engagement resulting from the adoption of the system explained, and that his savings will greatly exceed the quantum of 5 per cent. To this sum of the pensions will be added the bonuses provided by Article 11 of the law of July 22, 1886, for pensions of less than 360 frs. The company's allowance, instead of being equal to the sum kept back from the wages or some arbitrary amount, might be fixed, as at Works R, by technical results of working during the year.

The system of individual pass-books has been adopted because it is simple and easily understood by the workman, eminently practical, and the pension is guaranteed by the State. I must, however, observe that I consider M. Leclerc's idea of a single pension fund realizable only by means of a mutual-aid society, the common funds of which would be deposited at the "*Caisse de Dépôts et Consignations*," as decreed by the law of Mutual-Aid Societies, dated April 1, 1898. The amount of the pension would be calculated according to Article 9 of the law of July 20, 1886, of the National Old-Age Pensions Bank. Thus the company would not have to guarantee a fixed sum at a given time, conformably with the advice of M. Jules Michel, an authority on provident institutions (particularly for railways), who says: "Give pensions, but promise nothing." The common funds would be formed from wages; the annual allowance by the company being separate, as in the system of individual pass-books. In case of dismissal, the workman has always his right of membership, though he would not be likely to retain it by paying his premiums. Moreover, he could not disturb a society formed mainly by a great number of works with their offices in Paris. The advantage of the system, compared with the individual pass-book, would be an interest on deposits of 4½ per cent. instead of 3½ per cent.; consequently higher pensions in the same proportion. The Society would also have State subsidies, according to the provisions of the law relating to Mutual-Aid Societies—Article 26 of the law of April 1, 1898. The Society would thus merely be responsible for the calculation of the pensions and paying in of the funds to the bank. If the *rôle* of a Technical Institution prohibits intervention directly in founding such a Society, it is certainly our duty to ascertain its possibility, and (the case arising) to promote such a Society outside, but in proximity to, itself.

In brief, the work of stokers might be thus remunerated: 1. Fixed wages, paid by the fortnight, 1 per cent. being retained for the Provident Bank and 5 per cent. for old-age pensions. 2. Premiums on manufacture, payable at fixed dates, 5 per cent. being retained for the provident fund and 20 per cent. for pensions. 3. Annual allowances by the company—all entered to the account of pensions improvement.

In concluding this work, I beg my colleagues to excuse me if I have allowed myself—owing to the interest of the question—to be led away into long explanations. I am convinced that the stoker is interested in his work not by mere wages only, but also by the assurance of provision being made for him in days of sickness and old age. In order to attain this, I would remark in conclusion (adapting an ever-true maxim which puts tersely all I have written): "Help thyself, the Master will help thee."

DRY METERS: THEIR ADVANTAGES AND DISADVANTAGES.

By W. Asselbergs, of Bergen-op-Zoom.

[A Paper read before the International Gas Congress at Paris.]

Among modern improvements in plant for gas manufacture under the most economical conditions, it often happens that little attention is bestowed on the distributing system, and especially on meters, although the latter occupy a most important place. The meter may be defined as an instrument which measures the quantity of the product sold; but its action, no less than its construction, is very superficially understood by us. Still it is the *bête noire* of the consumers. They have a lurking suspicion that meters are not always accurate in their registration of the gas consumed—that some record too much, others not enough; and that gas companies fit up (so they conclude) only those meters which register to their own advantage.

Hence it will be understood that, when the public were, some twenty years ago, informed by the vendors of gas apparatus that a new meter could be supplied to them which did not require water (so that the monthly adjustment of the water-level would be dispensed with), and, further, that these dry meters registered to the advantage of the consumers, many of the latter adopted dry meters, particularly as they observed that the managers of gas-works viewed them with no special favour, if not with absolute mistrust.

Now, is the dry meter actually an instrument deserving of this want of confidence? No meter, wet or dry, measures gas with unvarying accuracy. Our laws in Holland allow a difference of 5 per cent. on either side of the correct reading; but in the course of my experience in checking meters I have found differences of 20 to 30 per cent. with both wet and dry meters.

The question of the accuracy of the measure by which gas is supplied, is one of moment to every works. We do not want a consumer to pay too little, nor too much. We wish him to pay merely for what he has really had. As the many discussions at Association meetings show, this question of meters has engaged the attention of the gas profession from the commencement of the industry; and much time has been devoted to pointing out

to manufacturers the defects in the instruments, and in studying the methods of eliminating them.

The wet meter is so well known that, for the purposes of comparison, we need only study the dry meter. It may be pointed out first of all that the dry meter is not by any means a recent invention. The first meter constructed by Clegg for measuring gas was a dry instrument. It was a very primitive arrangement, consisting simply of two bellows. As it gave unsatisfactory results, Clegg abandoned it, and invented his wet meter. Some time afterwards, an American workman constructed a dry meter with moveable discs; but, in spite of many improvements and great expense, no practical instrument was forthcoming. It was not until Croll and Richard brought out their patent that the dry meter was used for measuring gas; and at the present time the Croll meter (as subsequently improved by Glover) is the most extensively used of all dry meters.

Before making comparisons between wet and dry meters, I may state that some eminent authorities in the gas profession strongly condemn the dry meter, and use it only in exceptional cases; while others equally eminent make very considerable use of the dry meter—in some cases to the total exclusion of wet meters. Among manufacturers, one will pronounce the dry meter the best instrument, and another will consider it impossible and inadmissible for correct registration. Engineers and others who control the out-door departments, after having first accepted dry meters only provisionally and on trial, and after having taken the necessary steps to ascertain their errors in practical work, are now relinquishing their distrust of the dry meter, and are permitting the use of well-made instruments of this class.

Before advancing an opinion as to the value of the dry meter, it will be well to discuss the results of the investigations to be found in the proceedings of the various Gas Associations, to which I can add information acquired in course of correspondence with the makers of various types, as well as with a large number of my Dutch colleagues, who have had dry meters in use for some years past.

The most important communication on dry meters with regard to their advantages and disadvantages is that by Mr. Travers before the Gas Institute in 1884 and the discussion which followed. In a paper by Dr. Lowenherz, of the Registration Department, Berlin, read before the Association of German Gas Managers, there is also much information. Then there is much useful matter in the correspondence in the pages of the Dutch journal "Het Gas," and in the report of the proceedings of the Commission of Inquiry on the Registration of Gas-Meters in Holland, and in the *brochures* by which this report was followed—viz., those by Dr. Ryke and Dr. van Doesburgh. There is also Mr. Glover's work, entitled "Correct Measurement." A careful analysis of these various sources enables me to enumerate the alleged advantages and disadvantages of dry meters. First, the dry meter is recommended on the score of an exact and uniformly accurate measure. All those who have made trials on this point, as well as others who have communicated the results obtained in their practice, state that errors attending the use of dry meters are greater, both in number and magnitude, than those observed in connection with wet meters.

At the meeting of the Gas Institute in London in 1884, most of the English gas managers (in fact, almost all of them) affirmed that the dry meter registered too little—*i.e.*, to the disadvantage of the gas company; only one manager, on the other hand, recorded a registration in favour of the gas company. The German managers found that, as a general rule, the dry meter registered too much—*i.e.*, favoured the companies. The meters first used were almost all on the English Croll-Glover system, or of English manufacture. This disparity in the records of experience arises chiefly from the make and capacity of the meters. There were, of course, good, bad, and indifferent.

At that time there were in England many one-light dry meters, and some even smaller—known as Nos. o and oo. The consumers, almost all of whom purchased their meters from a dealer in gas-fittings, naturally obtained the cheapest; and it is, therefore, not astonishing that many of them were supplied with meters which were too small and of inferior construction. It is not surprising, too, that many of these small meters should have made incorrect records and have given rise to complaints—a frequent cause of difficulties and trouble to the companies' employees, who naturally discountenanced these meters and preferred their own wet three-light meters.

According to Dr. Lowenherz, in his address to the 1885 meeting in Germany, a special Commission was formed at his suggestion, and was entrusted with the consideration of the meter question. The conclusions of this Commission, though not decisive, contain much valuable matter on the subject. A report of the results obtained by the six gas-works which had participated in the official investigations, states that, with the assistance of the Registration Department, more than 4000 dry meters were examined between 1892 and 1895, in which were included very various specimens as regards size and construction. Some of the meters had been in use for a year only; others for 28 years. Of all the meters tested, it was found that two-thirds registered well—*i.e.*, within the limits of an error of 4 per cent. on either side of correctness; while of those which were inexact, three-fifths registered too much, one-fifth too little, and one-fifth were leaky.

It was found that the liability of the meters to register too much showed especially during the first three years. This period was followed by another, in which the meter registered normally. Afterwards a tendency developed to register too little. Lastly, leaks and breakages in the surface of the bellows commenced to appear. The Stockholm Gas-Works, which have fitted up a very large number of dry meters, checked for seven years one-sixth or one-seventh of the meters connected, and found that out of the number thus tested (which was 31,524, of which 27,612 were of English and 3902 of Dutch manufacture) 25,482 registered within the limits of 5 per cent. fast or slow, 872 registered more than 5 per cent. slow, and 1253 registered more than 5 per cent. fast.

In a large German town, where 220 dry meters were similarly tested, 157 (75 per cent.) were found correct within 4 per cent.; 47 registered more than 4 per cent. fast (among them were some which registered up to 10 per cent. fast), and 16 meters registered a little more than 4 per cent. slow (two of which showed an excess of 19 and 20 per cent.—due, no doubt, to leakage). In some cases, the causes of inaccurate measurement were found to be dry leathers, split leathers, badly fitting valves, and deposits on the leathers and jointed rods.

In order to ascertain to what extent the wet meter is liable to error in actual practice, it is necessary to make the test, under working conditions, by means of a second check meter, which is accurately adjusted every day. The experiments made on these lines have not furnished any results worthy of publication; for their difficulties and cost make it impossible to maintain a sufficiently large number of meters over a given period. The works' tests of wet meters are not applicable to conditions prevailing on the consumers' own premises. In the works laboratory, the meter is placed in an exactly horizontal position, and is adjusted before trial; while in the other case the condition of horizontality is not assured, and a change in the water-level may take place the day after adjustment, through evaporation. A wet meter, as ordinarily used, may therefore give rise to far greater errors than those observed in laboratory tests. It may even happen that a meter which allows a consumer's gas to pass entirely unregistered (say, through the water-level being too low, and the valve not being closed) may be found in perfect order on a laboratory test. Hence it is far from easy to ascertain whether the errors of wet meters are greater or less than those of dry meters. All that can be said is that the errors of wet meters are to the disadvantage of the gas companies.

The conditions of accurate measurement by the wet meter are: (1) Water-level at the normal height. (2) Base of meter parallel to the surface of the water. (3) A horizontal position of the meter. (4) Fairly constant gas pressure.

A second advantage claimed for dry meters is that there is no danger of fluctuation of the flame or momentary stoppage of the stream of gas—factors in causing irregular illumination, and even total cessation of the gas supply. These annoying effects are frequently observed, it is said, in connection with wet meters.

A third advantage is the absence of any need for levelling; there being no screw to be disconnected by the employee, no danger of leakage through improper re-screwing, no unpleasant odour, no mess, no danger of explosion. The greater cleanliness of the dry meter permits of its installation in situations in which the wet meter would be vetoed, and consigned to cellars and dark corners difficult of access.

A fourth advantage (of no slight importance) is the fact that it is more difficult to tamper with a dry meter than with a wet one. It cannot be "faked" by inclining it to one side or forward. I have placed a dry meter at an angle of 30°, and under test conditions could observe no appreciable vitiation of its registration. The mechanism of the dry meter cannot be tampered with without showing some sign on the exterior of the meter. There is no regulator level which can be broken by undoing the screw to the fullest extent. There is no wheel liable to be perforated by the delivery-tube; and no lower valve-box wall in which an aperture can be made.

The dry meter resembles the wet meter in permitting falsification by damage to the walls of the outer case, or to the clock-work; but such attempts are at once detected. One may, therefore, reasonably conclude that there are less opportunities for fraud than with the wet meter.

During cold weather, the functions of the dry meter are never upset by the frost. There is no damage to the mechanism by ice, or risk of explosion when the latter is thawed. The advantage of excluding water from the distributing system of houses is a very important one in times of frost.

The dry meter takes up less time when an examination is being made for test purposes. There is no need to water or level—a double advantage, since less labour is required and the consumer is spared the frequent visits of the inspector, whose object he is very liable to suspect as that of increasing the readings of the meter. There is less corrosion by water. The meters can be placed in the driest spots, since there is no need to select the lowest part of the house (as is necessary with wet meters so that the condensed water may return).

It is sometimes said that the wet meter is of more solid construction, and exacts less for wear and tear than does the dry meter. This was formerly true; but for some years past more careful manufacture and critical selection of materials have been the rule. Lead plate has been abandoned for the outside cases, in preference for sheet iron of special quality. The leather used for the diaphragms is of the first quality—carefully prepared and

selected, and treated with a solution to render it impermeable by, and resistant towards, the gas. Another reason for the immunity of the interior mechanism from deterioration by the gas is the purer quality of gas now made. The ammonia (of which gas formerly contained more) acted most prejudicially on the metallic portions of the meter, as well as on the oil with which the diaphragms were treated—rendering the latter less flexible. From some considerable number of quarters, I learn that the expenses of repairing dry meters are rather less, instead of greater, than those of wet meters.

Some statistics obtained by the Dordrecht Gas Company may be cited on this point. The number of meters purchased in 1887, 1888, 1889, and 1890 was 199 altogether; and the cost was 5370·32 florins (= 11,277 frs). The total cost of repairs in the four years, and up to the day of my visit (in 1897), amounted to 536 florins (= 1125 frs.)—say, for ten years, about 10 per cent. (2·50 florins or 5 frs.) of the value of the meter—*i.e.*, approximately 25 c. to 35 c. per meter per year.

After having witnessed the manufacture of the meters and estimated the cost of repairs, shown in the books, I asked the maker if, by increasing the price of the meters 10 per cent., he would guarantee the maintenance of the dry meters in working order for ten years at his own expense. His reply was that he would accept such an offer. It is therefore seen that little risk is involved in taking a number of dry meters on trial on these terms. There is little likelihood of the repairs being greater than stated above.

The dry meter has thus many advantages over the wet form of instrument; and if the supply of a solidly made and carefully adjusted meter could always be relied upon, a few years would see the disappearance of the wet meter. Theoretically, the latter is a more exact measuring device. The volume of a measuring vessel and the volume displaced on each revolution of the wheel can be calculated very exactly; but not so with the dry meter. The volume displaced by each movement of the bellows is nominally the product of the area of the moving disc into the distance traversed. But the volume of gas actually displaced does not invariably tally with that obtained by calculation; for it cannot be predicted how the diaphragms of the instrument will be acting.

Not long ago it might have been said that every gas manager of experience rejected the dry meter for measuring purposes. Nevertheless, it is a fact that more and more dry meters are being purchased, even by works in which they were previously condemned. In 1884, Mr. Livesey stated that he had not placed a single dry meter in his district; but I now learn that the South Metropolitan Gas Company have been fixing a constantly increasing number of dry meters during the past ten years, and that all the prepayment meters, of which the Company had 60,000 in 1892, are dry meters. The same tendency is encountered in most works.

My Dutch colleagues (the larger proportion of whom purchase more dry than wet meters) say that the dry meter is more convenient, cleaner, and more in public favour, and that it is often specially asked for by consumers—among others by those using gas-motors, who in this, as in other matters, follow the advice of the makers of motors.

Most gas managers are now accustomed to purchase dry meters, even though they contend that the wet meter is a more exact measure. ("Is" in this last sentence should be read "may be.") To the gas company there is no loss nor great profit; for though some meters may register too little, others register too much, and in the words of Mr. Livesey at one of the meetings of the Gas Institute, it is a case of robbing Peter to pay Paul.

It is not right to make one consumer pay for what another escapes payment for. But unfortunately the public frequently suspect the good advice given them; and when a gas official says that the dry meter is not as good as the wet one, the consumer most frequently assumes that the dry meter will be to his advantage, and forthwith obtains one. There is, therefore, no reason why the wishes of the public should not be acceded to—all the more as the dry meter possesses certain undeniable conveniences. All that the company may do is to test the meters from time to time, in regard to their accuracy of measurement.

Speaking of the dry meter, I have had in mind the Croll-Glover instrument, which is the most in vogue. In America, a triple-bellows meter (the Defries) is in use. In Germany, the meter of Emile Haas, of Mayence, known as the "Va," is coming into use. For some time past a factory for the making of these "Va" meters has been worked by Messrs. Elster, of Berlin, whose dry meters (especially prepayment meters) have met with much favour.

One advantage claimed for the Haas meter is its accuracy even after long usage. Owing to the special construction of its moveable partition, the meter can give a surplus in the diaphragm without affecting the measurement, since the capacities of the measuring chambers are limited by fixed walls, against which the diaphragm presses. No vitiation of the reading follows from the closure or enlargement of the diaphragm. The surfaces of the moveable partitions being larger in area than those of other types of dry meter (the pressure of the gas thus acting on a larger surface), the mechanism of the meter is actuated with greater ease and regularity. The slide-valves, being heavier and longer, move more readily on the guides, and there is less danger of escape of gas.

Heer Salomons, the Engineer of the Feyenoord Gas-Works, Rotterdam, has tested some of these meters for a year or more. He placed in serial order, a five-light meter, a three-light meter, and lastly a second five-light meter. After the passing of more than 1000 cubic metres of gas, Heer Salomons found that the differences between the three meters did not exceed 2 per cent. When 720 litres passed the three meters per hour, the diminution of pressure was only 5 mm.; and this rose to 20 mm. with 1500 litres per hour. With 1600 litres per hour through a single five-light meter, the loss was only 7 mm., and only 2 mm. with 960 litres per hour. It is thus seen that these meters have a greater capacity than is nominally assigned to them.

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at Durham.

The Forty-Seventh Half-Yearly Meeting of this Association was held on Saturday at Durham, the residence of the President for the year, Mr. E. H. MILLARD, the Engineer and Manager to the City of Durham Gas Company. There was little business on the *agenda;* and this, together with the fact that the General Election was still requiring the services of some of the members, accounted for the absence of several who are usually present at the gatherings of the Association. Still a goodly company mustered at the Gas Office in Claypath at noon. Light refreshments were served, after which the meeting was constituted in the Board-room of the Company.

The PRESIDENT introduced the Chairman of the Gas Company, Mr. John Coward, J.P.

Mr. COWARD said he was present to accord to the Association, on behalf of the Company, a hearty welcome to the city of Durham. It was a very inopportune time for them to be there; but, of course, when they appointed the meeting to be held on that date, they had no idea that they were going to have a General Election. He and the Vice-Chairman (Colonel Rawlinson) were much engaged; but they had made arrangements to try to entertain the members in the best way they could. He hoped their meeting would be a good one, and that they would have many pleasant reminiscences of their visit.

NEW MEMBERS.

The PRESIDENT said he was desirous of introducing an innovation in their practice. There were so many new members joining, that they were in danger of not knowing them all; and he would like the proposers of new members or associates to formally introduce them to the meeting after their election. The following were admitted to the Association:—

Members.—Stout, W. H., Walker and Wallsend Union Gas Company; Buckley, A. E., Corbridge.

Associates.—Burn, J. H., coalowner, Newcastle; Haswell, W. Spence, Manager, Tangyes Limited (Newcastle); Constable, P., Messrs. James Milne and Son, Limited (Leeds); Miller, J. C. (Rugby), representative of the Eagle Range and Gas-Stove Company, of Birmingham; Batt, W. (Manchester), representative of Messrs. T. Glover and Co., Limited.

In accordance with the desire of the President, these gentlemen were presented to the meeting and shook hands with the Committee.

ABSENT MEMBERS.

The PRESIDENT intimated that apologies had been received from several gentlemen who were unable to attend the meeting.

The President then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I regret the position we are in to-day, in not having another paper to follow on the very sparse matter I have now to lay before you; but at the very last moment I was disappointed in a gentleman who I thought would have come forward. He has, however, been so long on his holiday that he has found he had not time to prepare a paper for discussion to-day.

I think I also ought to refer to an incident which occurred last week, in the election of a gentleman whom we are all delighted to know was successful at the polls. I refer to one of our associate members, and a Past-President—Colonel Sadler. There is another gentleman of whose success we are pleased to hear—Mr. W. R. Plummer, of Newcastle, who presided at our dinner last year.

I beg to tender you my thanks for the honour you have done me in electing me President of our Association. I cannot say it was unexpected, as it naturally follows the Vice-Presidency. But I can truthfully say the promotion to the latter office was entirely unexpected; and I am afraid I accepted, and so took the plunge, without fully realizing to what I was committed. However, with your kind forbearance, I will do my best, and by the aid of the Officers and Committee, trust to pull through my year of office in such a manner that my successor may take the chair with the hitherto undimmed lustre which clings to it from its association with the long line of eminent men who have so ably filled it in the past.

I think that we must congratulate ourselves on our numerical strength, and also upon our average attendance from so wide a district, which shows a healthy interest in our Association and its work. I may say that the total members and associates in October, 1895, was 106; in October, 1900, the number is 142—an increase of 36, or not less than 33⅓ per cent. I trust that the younger members will take care that it is not allowed to degenerate into a technical France, but that it shall produce a healthy progeny of papers and communications. Their efforts will receive the kindest reception, as in no body of men have I noted a keener interest and goodwill expressed for the progress of the younger members than in this Association—more especially by the veterans, and often with an entire abnegation of their own claims. We younger members, however, must be careful not to allow them to carry this obliteration of self too far, but see that our Committee shall always be ballasted with a good proportion of them. If we allow them a well-deserved rest from the preparation of papers, they will not shirk their duty in this direction.

We are living in troublous times for all connected with gas-works management; and every effort will have to be strained to maintain our position as head of the artificial lighting industries. These periods of tense struggles come round in cycles; and ten years ago we were confronted with this same question of advancing the price of gas. As this was successfully negotiated, so no doubt the present corner of high price will also be turned; and we shall have the satisfaction of seeing the price of gas again return to what we may term its normal condition.

We must not forget, however, that the price of coal is not affecting our electric lighting competitors to the same extent as ourselves; and they will doubtless take full advantage of their opportunity. But, on the other hand, the cost of their plant has advanced in greater proportion than ours, so that all extensions carried out now are laying a charge for the future. The advanced price of coal during the last two years represents an addition of 0·34d. per unit to the cost of electricity, or (say) equal to 2¾d. per 1000 cubic feet on gas; but to gas-works it means not less than 4d. per 1000 feet, even after allowing for the advance in the price of residuals. However, we need not become despondent; for the truth of the old proverb that "Every cloud has a silver lining" is being abundantly justified, since the high price of household and manufacturing fuel has given a boom to the use of gas for cooking, heating, and motive power. The position we have attained will not be lost, except by our own negligence.

The vaunted growth of the electric lighting industry has been trumpeted forth with a far louder blast than the occasion really warrants. I have recently taken the trouble to ascertain the units of output of electricity in several towns; and, after converting these into an equivalent number of cubic feet of gas, I find that the average result would only represent an addition of 10 per cent. to the gas-works in those towns—and this, too, in places where electricity is supposed to have made enormous progress. Good will also have been done by promoting experimental work with a view to the production of a cheaper gas, as is already evidenced by two processes at least being on their trial as to suitability to the conditions prevailing in this country—viz., Professor Lewes's methane gas at Sligo, and benzolized water gas under the Dellwik-Fleischer process at West Bromwich—the working results of which will be awaited with interest.

I am afraid those who expected to find in carburetted water gas a panacea for their troubles in this direction will have been disappointed, as with the advance in the price of coke and oil the cost of its production has increased in a greater ratio than that of coal gas, except in isolated positions. These remarks may appear strange from an adherent to this method of gas making. But it was for its other advantages that I advocated its adoption here; and there is little doubt the price obtainable for gas coke to-day is largely due to the amount taken off the market by this process. It has also, where adopted, eased the labour question; and there are many companies who would to-day rather pay a little more in the cost of this gas, than have to bear the tyranny of the labour organizations, who have succeeded in exacting for the labourer at this class of work a remuneration beyond that of a skilled mechanic, and are still not content—agitation being on foot over this north-east district.

While on the subject of carburetted water gas, there is one point to which I do not remember attention being called—viz., that where it is purified along with coal gas there is a danger of the greater proportion of carbonic acid which it contains interfering with the action of the sulphide purifiers. Of course, this was to be expected; but in the tension of meeting the heavy demand of three or four exceptionally dark days by increasing the proportion of carburetted water gas, it is just one of the points apt to be lost sight of.

The successive alternations of times of good and bad trade should surely serve as pointers to gas companies and corporations to carry out their extensions, even beyond their absolute requirements, while materials and wages are low—confident in the future of our industry—instead of waiting to be forced by necessity to undertake the requisite increase of plant during times of boom in trade, at an increased cost of 40 or 50 per cent. Even in America, the land *par excellence* of the electric and other competitive lights, such confidence is felt in effete coal gas that I am informed, on the authority of one of our members who recently visited the United States, that the Manhattan Gas Company have purchased 200 acres of land for the erection of coal-gas works.

While on this subject, I cannot help noting the tendency to carry increasingly heavier pressures, until the high-pressure service mains used by some of the larger works demand more pressure than the gasholders are able to give, when mechanical means have to be introduced in the form of exhausters or fans. Taking into consideration the marvellous results produced by the blowpipe action of the various compressed gas systems on the incandescent mantle, and the general approbation extended to a lower standard of illuminating power of gas which would be equally efficient with such burners, does it not appear reasonable to expect that the day is not far distant when it will not be necessary for individual consumers to erect installations to compress the gas for themselves, but they will have it delivered to them at the necessary pressure? I believe this increased pressure will be corollary with reduction of illuminating power. For various trade purposes, this increased pressure would be invaluable; and the idea is by no means a visionary one, as has been shown us by Mr. Shelton (see his paper read before the International Gas Congress at Paris) in America, where a high-pressure system has been completed to work at, not merely 10 inches, but up to 20 lbs. per square inch on a main nearly 5 miles in length. Difficulties would no doubt occur, especially in districts subject to settlement; but the extra pressure would all the sooner reveal any leakages which might occur.

At this juncture, I am led to remark on the difficulty of testing long lengths of leading mains for leakage at the present time, with continual demand at all hours of the day, which renders the old method of cutting into sections a most inconvenient one for the consumers; and it suggests itself to me that an inexpensive portable gas-compressor would satisfy the want by delivering high-pressure gas along a small auxiliary, light, wrought-iron pipe, laid on the surface of the roadway, to supply the consumption beyond the section under test. If some such apparatus were introduced, it need not remain idle except when used for this purpose, as it might also be employed to supply compressed air to a pneumatic caulker for setting up the lead joints when laying mains, in lieu of the usual manner by hand. This should result in considerable economy of labour, and, what is of more importance still in the main thoroughfares of large towns, in saving of time. It might also come in handy for the pneumatic spray painting of gasholders.

I have for some time been of opinion that there is an opening for the display of originality in the introduction of machinery in mainlaying operations; the motive power for same being compressed air conducted by flexible hose in the usual manner from a high-pressure air receiver mounted on wheels, on the top of which could be fixed a gas-engine to drive the necessary compressor. The application to the filling in and ramming of the trenches, in particular, does not seem to present any insuperable difficulties.

I have often been struck with the wasteful use of steam in an ordinary gas-works. In the majority of instances, the fuel, no doubt, is cheap; but surely it is worth while employing the exhaust steam to heat the feed water, or, as in my own case, using it under the fire-bars of regenerative furnaces.

Another point I notice is the lack of means for the extinguishing of an outbreak of fire. Most works will have a pump, from which it would be possible to connect mains with hydrants placed at suitable parts of the works. These, with a length of hose, would enable any outbreak to be promptly met; and it is the minutes at the commencement of a fire which really determine its fate.

I feel that this address would be incomplete did I not refer to the work carried out by the Committee and Secretary on the Workmen's Compensation Act, upon the initiative of Mr. Bower. The various Insurance Companies having taken what is considered a reasonable view of the case, your Committee have declared their labours finished in this direction. I may say that our useful Secretary, Mr. Penney, will be very pleased to give any further information with reference to this matter, to the members of our own Association or to any others connected with the gas industry who may wish for it.

I cannot help thinking the Association might be made much more useful to the companies with which the members are connected by the issue of a weekly or monthly trade circular, giving information as to the course of the various markets in coal, coke, tar, pipes, and all materials used or sold at gas-works. Of course, this would mean our Secretary being provided with paid assistance; and the information would be compiled from particulars to be supplied by the members generally as to prices paid and obtained. A small subscription from each Company would soon be repaid them by the better terms they might secure. I have found this interchange of information so useful in a small circle, that it could not but prove beneficial in an enlarged sphere.

The abnormally high price obtainable for coke at the present time has led me to turn my attention to the burning of tar for heating the furnaces, as it is evident that with coke at 24s. or 25s. per ton f.o.b. north-east ports, it is better to do so than sell tar at any lower price than 29s. per ton.

Mr. M. Dunn (Goole) said it was with pleasure that he rose to propose a hearty vote of thanks to Mr. Millard for his excellent address. He certainly had given them some data to be going on with—information which would bear reading again, and which, no doubt, would be productive of much good.

The PRESIDENT thanked the members cordially for the manner in which they had received the proposition. He could say truly that anything he could do for the Association was no trouble to him. His only regret was that a series of experiments of which he had hoped to inform them in his address had been blocked at the last moment through failure on the part of the makers to let him have the apparatus in time. However, it was a matter which could be given again. He was very pleased, indeed, to see so large a turn-out of members, and trusted that the lack of any great amount of technical information, which they looked for at these meetings, would not interfere with the pleasure of their visit to Durham.

PROPOSED FEDERATION OF GAS-WORKS EMPLOYERS.

Mr. T. BOWER (West Hartlepool) obtained permission to mention a matter which, he said, had been on his mind, and which he had no doubt had been on the minds of many of the members. It was with regard to the labour question he wished to speak. They had, in the President's Address, an acknowledgment of the services which the Committee of the Association had rendered in another direction—in connection with insurances under the Workmen's Compensation Act. He thought the Committee might very well go further, and take up this other matter, seeing they had so well fulfilled the duties they undertook before. They might have a Committee of the North of England Association formed to deal with the labour question. He was not one of those who thought they should exact from their stokers and other employees the very uttermost they could. He should like to be as liberal as possible to his workers, as he hoped his Directors would be to himself; but when he had said this, he wished to point out that there could be no doubt whatever that there were many cases—and his hearers would bear him out in what he was going to say—where a favour, or some perquisite, it might be in various directions, was exacted from one company or corporation in favour of their workmen, and which was used, he might say, as a whip in extracting from other companies or corporations, who were working under totally different conditions, a similar favour—it might be money or some other form of perquisite. It seemed to him that if they had some sort of Conciliation Board, or Reference Committee—let them call it what they liked—a Committee that could deal with labour questions pertaining to all gas-works connected with the Association, it would serve some good purpose. He believed something had already been done in this direction, and that at the present moment some of the Gas Companies on the north-east coast were meeting together, or were in conference with each other, as to the basis to be laid down for wages. It would very likely be known to every member present that a general application had been made in all the gas-works (his own included) for a very large advance in the wages and conditions of labour of stokers and other employees; and it was for this reason that he thought it would be to the interest of the members of the Association, and of those whom they served, that they should do something. The least they could do was to refer the matter to the Committee of the Association, and let them look into it, and see if they could formulate a scheme, or do anything which they thought would be conducive to the best interests of the Association and of the workmen. He did not mean that there should be anything done which would be of a one-sided character. Whatever they did, it should be opened up so that the workmen should have an equal voice with them, and that they might hear their voice. He would not mind the men having their representatives present. He considered that a workman was entitled to get the best possible value he could for his labour; but what he did say was that he had no right to insist upon conditions which were not at all suitable for the works where he was stationed, and which, in some cases, as he knew, had been tyrannical. At the same time, the workman was entitled to fair consideration, and to have a fair say. Those were matters which the Committee might look into, get some information upon, and submit to a future meeting of the Association some sort of draft or suggestion as to the basis on which an Association could be formed. If it were their pleasure, he would move that some such step be taken. Perhaps before it was put to the meeting, some of their friends who were in the throes of labour difficulties might express their views on the matter.

The PRESIDENT was very pleased indeed that Mr. Bower had brought the matter before them. It was a point on which his Chairman was talking to him a few days ago. If it had not been for his being so busy with the elections, the Chairman would have liked to have said something about the labour question that day. He (the President) quite agreed with the idea Mr. Bower had expressed; and he knew that others were also moving in the direction in which Mr. Bower wished to move. He was pleased that Mr. Bower looked to the Association for some pronouncement on the matter, as it was following on the lines on which he should like to see the Association made use of.

The HON. SECRETARY (Mr. J. H. Penney, of South Shields) said the question was a very burning one; and he was glad Mr. Bower had been good enough to bring it before the Association. At the present time, in the North of England three gas companies had been what they might call attacked by the labour populace making a very large demand upon them; and he was very pleased to say that they had federated, to try to come to some definite arrangement whereby they might be placed on a level in regard to wages. Hitherto the tactics of the Union had been to attack first one on what might be called a weak point—where the wages might be a little less—and, if they won, to go on to the next; and so on. This time they had rather altered their plans, and had taken a group of companies. The matter was now under the consideration of the gentlemen interested; and there would probably soon be some pronouncement upon it. He hoped it would point the way to a better future arrangement. He could not say what the result would be; but he trusted it would be favourable.

Mr. T. M. WALLER (Durham) said he had much pleasure in seconding Mr. Bower's proposal. He certainly thought it was high time that something was done in the direction indicated.

The motion was adopted.

The PRESIDENT said he was very glad it had been carried; but at the same time he felt that the Committee should be strengthened, in order to adequately deal with such a strong position as had been taken up by the Unions.

Mr. BOWER suggested that the Committee be asked to bring up at the next meeting of the Association a report as to what they thought was the most desirable thing to do, in order to introduce some form of conciliation between employers and employed in gas-works; and if the Committee thought to act on the President's suggestion, and invite outside members to assist them, they would have an opportunity of embracing the idea.

VOTES OF THANKS, &c.

Mr. W. DOIG GIBB (Newcastle) moved that the thanks of the Association be given to the City of Durham Gas Company for granting them the use of their Board-room for the meeting.

The vote was acknowledged by Mr. J. WILLAN, J.P., one of the Directors of the Company.

The business then closed.

VISITS AND DINNER.

The members afterwards visited the Cathedral and the Castle, both exceedingly interesting structures, and both, though of hoary age, still ministering to the needs of humanity—the one in the ecclesiastical, the other in the educational sphere.

On the invitation of the Gas Company, a party of about fifty sat down to dinner at a later hour, in the County Hotel. Mr. WILLAN presided. Among the toasts given were those of "The North of England Gas Managers' Association," proposed by Mr. COWARD, and responded to by the PRESIDENT; "The Chairman and Directors of the City of Durham Gas Company," proposed by Mr. GIBB, and responded to by the CHAIRMAN; and "Kindred Associations," proposed by Mr. T. HARDIE, of Gateshead.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The Second Annual Meeting of this Association was held on Saturday, the 29th ult., at the Technical School, Manchester—Mr. R. H. Garlick, the retiring President, in the chair. There were about thirty members present. The Council submitted their report on the work of the past year, which they stated had been very successful. The roll of membership had been well maintained; and the accounts showed a balance in hand. The members had enjoyed and benefited by the various visits arranged during the year; and the Council acknowledged the courteous manner in which the Association had always been received. Valuable papers had been read—by Mr. Frank West, on "Revivification;" by Mr. Lewis, on "Cyanogen;" and by Mr. Halliwell, on "Examinations in Gas Manufacture." There had also been several "Question-Box" evenings. As the result of Mr. Halliwell's paper, the Association had been in communication with Sir Philip Magnus; and he had laid their views before the City and Guilds of London Institute, who had promised to give them careful attention. The question of reporting and publishing the proceedings of the Association had been under the consideration of the Council, who, as the result of correspondence, were able to assure the members of better reports being furnished in the future. In looking forward to the current year, the Council expressed the hope that the members would individually help to make it a successful one by contributing papers at the meetings. The report was adopted. General satisfaction was expressed at the good progress already made by the Association, and confident hope was entertained for its continuance. The following officers were then elected:—

President.—Mr. C. Berry, Hyde.
Vice-President.—Mr. R. H. Garlick, Salford.
Treasurer.—Mr. R. B. Braddock, Radcliffe.
Council.—Mr. A. E. Mottram, Hyde; Mr. S. E. Halliwell, Littleborough; Mr. H. Smith, Bury; Mr. W. Baxendale, Chorley; Mr. W. Hill, Stalybridge.
Hon. Secs.—Mr. E. J. Wellens, Middleton; Mr. B. S. Haynes, Stretford.
Auditors.—Messrs. F. Oldfield and F. Irwin, Denton.

A few slight alterations were made in the rules; and the meeting was brought to a close by the usual vote of thanks.

The Instructions of the Metropolitan Gas Referees for the autumn and winter seasons, issued last week, contain, in addition to the alterations mentioned in our editorial columns, the usual intimation that 22 grains will be the maximum amount of sulphur allowed in every 100 cubic feet of gas until further notice.

REGISTER OF PATENTS.

Starting Gas-Engines.—Bell, J. R., of Ratho, N.B. No. 21,360; Oct. 26, 1899.

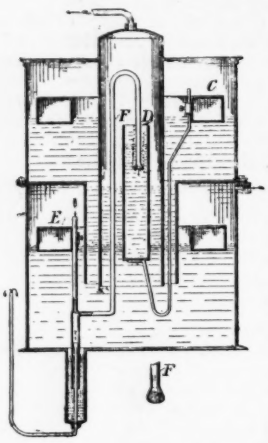
This starter comprises a hand lever or wheel, the boss of which is formed with a screwed or equivalent part to engage in a corresponding part formed on the end of the engine crank-shaft, or on a boss-piece fixed on the end of the shaft; the boss of the lever or hand-wheel being arranged to go out of gear on the engine starting and turning the shaft. The lever or hand-wheel is, however, prevented from being entirely thrown off by one or more pins in its boss engaging in a groove in the crank-shaft extension. Similar levers or hand-wheels may be applied to both ends of the crank-shaft; the screw threads being disposed to suit the direction in which the shaft turns.

Generating Acetylene.—Morin, R., of Quebec, Canada. No. 7539; April 24, 1900.

The object of this invention is to provide apparatus for generating acetylene that will "meet with all the requirements of the Underwriters' Association, as regards safety." It includes a safety-tank (which is a safety-valve) operated, not by pressure of the gas, but by the quantity of the gas generated. This "safety-tank" is operated by the rising of the main gas-storage tank; but, when once started, the rising and falling of the bell of the main tank stops or starts a flow of water to the carbide, and as this is automatic—the gas being generated instantaneously when the water falls on the carbide—the flow of water is regulated and cut off instantaneously. Self-feeding generators also are provided, independent of each other; so that one may be charged without interfering with the working of the whole apparatus. The invention further consists of sundry details fully described only by the aid of a series of nine sheets of drawings.

Gas Pressure-Regulating Apparatus.—Bullock, A. R., of Cleveland, Ohio, U.S.A. No. 7754; April 26, 1900.

This invention relates to contrivances for controlling the pressures between gas-generators and the points of consumption; and the object aimed at is to provide an apparatus whereby a predetermined pressure may be maintained at the terminals of consumption, regardless of fluctuations in the supply of gas to the regulator, and an irregular consumption of gas from it.



Within the vessel shown in the engraving there is provided a diaphragm having a tube depending from it. From the top of this vessel extends a flue, having a comparatively contracted outlet, and a full inlet. An opening below the diaphragm is provided for connection with a generator to supply gas to the apparatus. By means of the diaphragm, the vessel virtually becomes divided into an upper and a lower compartment, which are partially filled with liquid (water), and in each of which is placed a float or buoy. The boat C in the upper compartment carries the cup D, and securely attached to the float E is the pipe F of S form. One terminal of the pipe is in open relation with the gas-containing part of the compartment fitted with the float E; while another depends into the cup D. When vent is given through the outlet at the top, the flue and cup D become filled with liquid; also vent is then had from the lower compartment, so that the liquid rises until enough is supplied to fill the compartments to about half their capacity, in order to obtain the largest range of variation for the floats in a given height for the compartments. Furthermore, the higher the compartments, the greater can be the difference in pressures which may be established (and relatively reduced) by the apparatus. The regulation of pressure (or maintenance of a certain predetermined pressure) is afforded by means of the floats, and depends upon the extent to which the pipe F is returned into the cup D. The column of liquid above the immersed end of the pipe affords a liquid check against the emission of gas from the pipe. The deeper the pipe F extends into the cylinder, the greater the reduction in pressure will be between the incoming and outflowing gases. The distance between the lower edge of the tube and the bottom of the vessel limits the range of variation for the floats; and the connections of the float with the cup and pipe admit of vertical adjustment to suit particular conditions under which the apparatus is to be used.

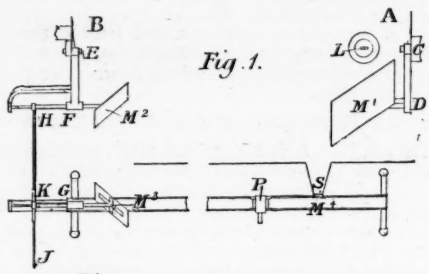
Photometry of Large Sources of Light.—Carter, F. W., of Birmingham. No. 8704; May 11, 1900.

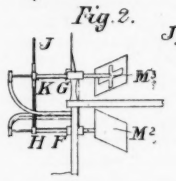
This invention is intended particularly to facilitate the photometry of high-power lights (of which it is necessary to examine the intensity or power in various directions).

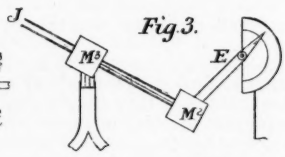
Fig. 1 is a plan of the apparatus—showing it arranged for the photometry of a light emitted at an angle of 45° below the horizontal. Fig. 2 is a side elevation of the mechanism marked B in fig. 1. Fig. 3 is a front elevation of the mechanism B. Fig. 4 is a front elevation of the mechanism marked A in fig. 1. Fig. 5 is a side elevation of the mechanism A.

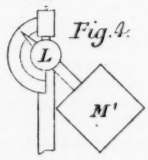
The mechanism A consists of an arm of metal C D M_1 (substantially as shown in figs. 1, 4, and 5), turning at C about an axis lying parallel to the photometer-bench M_3 M_4, and capable of being clamped in any position. This arm carries at M_1 a mirror, fixed relatively to it, and making an angle of 45° with C D and D M_1. Fixed to the arm is a pointer or other indicator of its angular position.

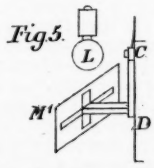
The mechanism B consists of an arm of metal E F, equal to C D (arranged as shown in figs. 1, 2, and 3), turning at E about an axis lying parallel to the photometer-bench, and in the same straight line as the axis at C. This arm is capable of being clamped in any position, and carries a pointer or other indicator of its angular position. It also carries at F a bearing in which a tube or rod M_2 H can turn and slide, and which is parallel to the photometer-bench. At G, which is on the same horizontal level as the photometer-head P, is a fixed bearing, in which











the tube or rod M K can turn and slide, and which is parallel to the photometer-bench. The tube carries at H a tube or rod H J (which may be in duplicate, as shown), fixed to it at right angles; and at M_2, a mirror set at 45° with M_2 H and H J. The tube M_3 K carries at K a cross-tube (which may be in duplicate, as shown), fixed to it at right angles, in which the tube or rod H J slides, so as to direct it towards H. At M_3 is fixed a mirror, set at 45° with M_3 K and H J. To the bearing F is attached an inextensible cord or chain F H K G, which passes through a ring or other guide at H, through another such guide at K, and is itself attached to the bearing G.

The light emitted in any direction from the source L will generally be compared with that emitted in a particular direction by means of the arrangement shown at S in fig. 1. This consists of a funnel of wood or other opaque material (painted white inside when necessary), with its wider end directed towards the source L, and its narrower end covered with a vertical translucent plate, whose effective area can be varied by means of stops. This plate is parallel to the photometer bench, and on the same level as the photometer-head. Opposite this plate is set a vertical mirror M_4, at an angle of 45° with the bench, in such a position that the image of the translucent plate formed by it lies in the path of the photometer-head. The funnel is shown in fig. 1, attached to a screen for intercepting the direct light from the lamp.

The invention is used as follows: The source of light L is set on the line C E, at a distance from C equal to D M_1. The arm C D is set so that the mirror M_1 receives light in any required direction from L. The arm E F is set parallel to C D, while the tubes or rods M_2 H, M_3 K are slid together through their bearings until the cord F H K G is just taut. The position of balance of the photometer is now found; the effective size of the standard S being varied, if necessary, by its stops, in order that balance may be found at a point on the bench. Thus the relation between the powers of the light in different directions is determined.

The action of the apparatus is as follows: The arms having been set as described, the light from L, striking the mirror M_1, is reflected along M_1 M_2. Now the rod H J turns the mirrors M_2 and M_3 in such a manner that the normals to their planes at their centres lie in the plane of H M_2 and K M_3. Since the ray M_1 M_2 is in this plane, it is reflected in this plane, and so traverses the path M_2 M_3; and at M_3 it is again reflected in this plane, and traverses the path M_3 P. Now the portion M_2 M_3 of the path of the ray of light varies in length with the position of the arm E F. This variation is allowed for by the sliding of the tubes or rods in their bearings; for, since the cord is kept taut, and H K is equal to M_2 M_3, it is clear that, when M_2 M_3 is increased by any amount, the mirrors M_2 and M_3 are each pushed forward by a half of the amount. Thus the total distance L M_1 M_2 M_3 M_4 remains constant.

Acetylene Generators.—Haddan, R.; a communication from the Adams and Westlake Company, of Chicago, U.S.A. Nos. 10,993 and 10,994; June 16, 1900.

These inventions relate to acetylene generators of the class intended to supply a distributing system provided with a plurality of burners—particularly for the lighting of railway cars, &c.

The objects of the first invention are stated to be: To provide for the generation of the gas without unduly heating the carbide from which it is made; to regulate a constant supply of water; to provide for the proper delivery of the water to the carbide; and to provide for the cooling of the gas and the condensation of the vapour carried out of the generator.

In the case of the second invention, the objects aimed at are stated to be: To provide a generator of the type in which water is conveyed in small quantities to a mass of carbide—the flow of water being controlled by the gas pressure developed; and a special object being "to provide means for combining in a single battery a number of comparatively small

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INSTRUCTIONS.

The Brass Plate has holes around its edge, numbered; these indicate the feet delivered for the Coin used
To set the Meter, note Figs. I., II., III., IV.

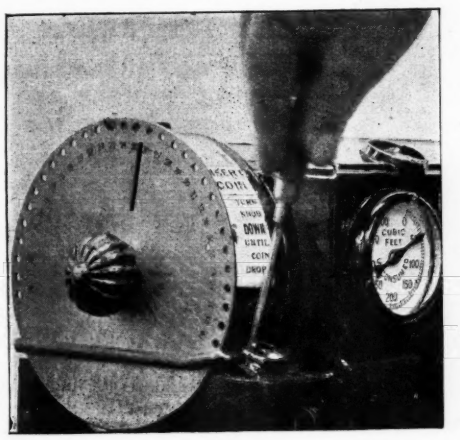

Fig. I.
Break Company's Seal and Remove Screw—THUS.

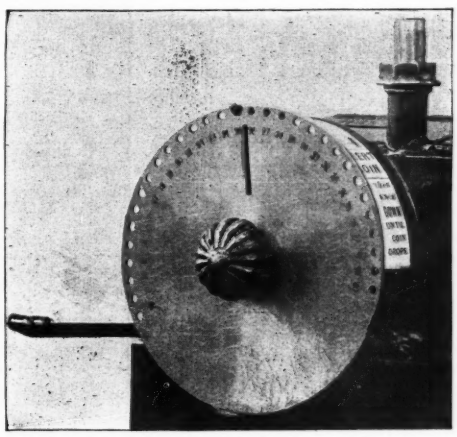

Fig. II.
Swing Band Back—THUS.

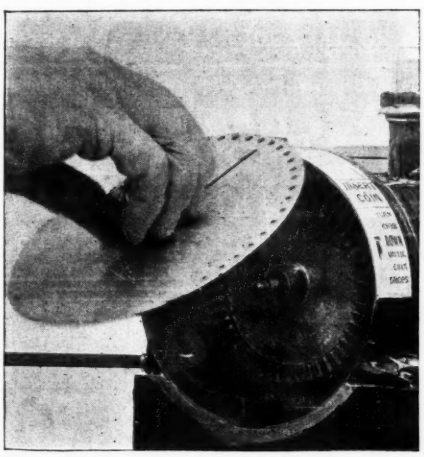

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

Swing Band Forward—Replace Screw—and Re-seal.

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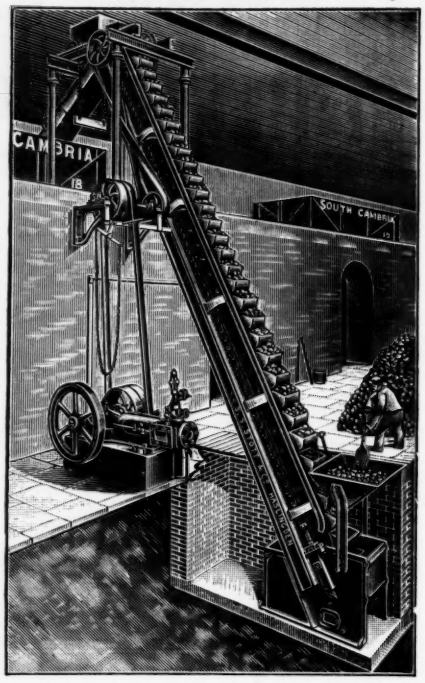

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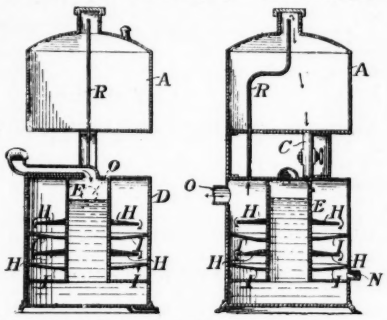
generators or cells which may be used in unison or in succession, as may be desired—means being provided for automatically bringing into action one or more generators after others have been exhausted of their charges, and for conveniently replacing an exhausted cell by one newly charged."

Neither invention is further described apart from a mass of detailed drawings, and lengthy lettered specifications.

Carburetting Air with Gasoline.—Wünsche, R., of Herrnhut, Germany. No. 10,574; June 9, 1900.

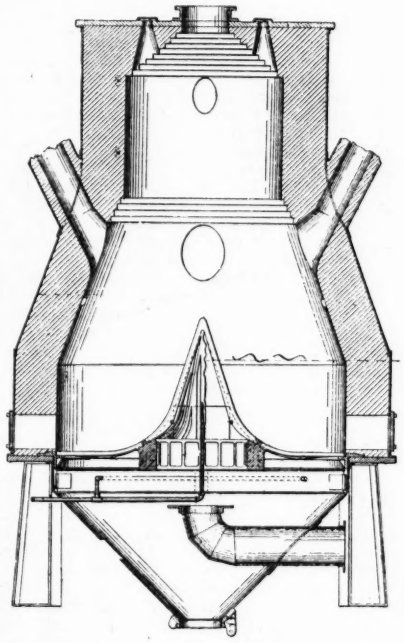
This invention relates to apparatus for carburetting air with gasoline, to be employed for purposes of illumination, heating of calendering machines in the process of finishing cloths, in combination with a soldering tool, and for similar objects. The apparatus (as shown) comprises, in combination, a reservoir A for the reception of liquid hydrocarbon; and



a generator D connected with the hydrocarbon reservoir by means of a pipe C, and containing centrally a cylinder E adapted to be heated by steam or water. A number of dropping-rings H I are alternately secured to the outer wall of the heating cylinder E, and to the inner wall of the generator D. A gas-pipe R leads from the generator to the space above the level of the liquid hydrocarbon in the reservoir A; while there is an air-admission pipe N at the lower end of the generator, and a gas-outlet pipe O at the upper end.

Manufacture of Water Gas.—Slocum, F. L., of Pittsburgh, Penn., U.S.A. No. 12,336; July 7, 1900.

This invention of apparatus for the manufacture of water gas, has for its object "to provide for the manufacture of such water gas by the quick blasting-up of the fuel (coal or coke), and the production of carbonic acid in large proportions in such blasting operation, so as to raise the fuel to a higher heat by shorter blasting periods, and provide for longer runs of gas-making."



The invention comprises, generally stated, a water-gas generator (as shown in longitudinal central section), having a wide lower combustion chamber gradually converging upwards, and having several waste-product openings at its upper end. Above these, there is a coal-chamber narrower than the combustion chamber, and having a feeding opening and a gas-outlet passage at its upper end. An extended grate-surface below the combustion chamber is preferably furnished with a conoidal central portion rising above the main body of the grate; and so providing for a rapid supply of large bodies of air to the mass of ignited fuel, and (through the central conoidal portion of the grate combined with the converging side walls of the combustion chamber) for the travel of the air and products of combustion but a short distance through the mass. This, it is claimed, leads to extremely rapid heating of the mass; the formation of a large proportion of carbonic acid; and the withdrawal of the products of combustion before they can absorb much carbon from the mass.

The generator consists in certain other improvements set forth in the claims, as follows.

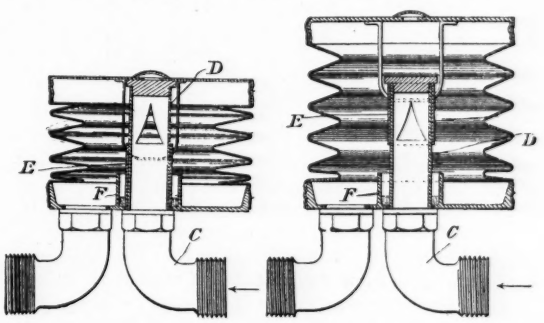
1. A water-gas generator having a wide lower combustion chamber; an extended grate surface as wide as the combustion chamber, the walls of the chamber gradually converging upwardly, and having waste-product openings arranged therein around its upper end; and a coal-chamber narrower than the combustion chamber, and superimposed above it, and having its lower walls merging into the upper walls of the combustion chamber above the waste-product outlet—the coal-chamber having a feeding opening and a gas-outlet passage at its upper end.

2. A water-gas generator having a combustion chamber with an extended grate, provided with a conoidal central portion rising above the main body of the grate.

3. A water-gas generator having a combustion chamber provided with cross-beams extending below, supporting a central ring; a central conoidal grate portion supported on the ring; grate-bars extending from the ring to the side-walls of the chamber; a steam-supply pipe, provided with a perforated ring portion under the horizontal portion of the grate; and a central steam-pipe rising within the conoidal portion of the grate, and having an outlet at its upper end.

Gas-Governors.—Child, J. F., of Honor Oak, and White, R. J., of Camberwell, S.E. No. 13,408; July 25, 1900.

This invention in gas-governors has for its object "to provide a governor of simple construction, by means of which a regular pressure of gas may be maintained in the outlet-mains notwithstanding the variation of draught, or variation of pressure in the inlet-mains."



The governor comprises an expansible chamber, which (as shown) consists of two saucer-shaped plates, having their recessed surfaces opposed to each other, and connected by flexible bellows. The lower plate is stationary, and has secured to it the inlet and outlet mains. The inlet-main C is preferably arranged at the centre of the plate, and communicates with a valve-body D, cylindrical in form, and rigidly secured to the plate within the expansible chamber. The upper end of the valve is closed in any convenient way; and the gas from the inlet-main makes its exit from the valve-body by triangular-shaped orifices formed in the wall of the valve. Surrounding the valve D is a sleeve E, free to slide upon the valve, and secured to the upper plate in the expansible chamber by supports. When the expansible chamber is contracted, the sleeve falls below the orifices in the valve D, so that gas from the inlet-main is allowed to pass freely into the expansible chamber—making its exit thence by means of the outlet-main, which communicates freely with the chamber. Should, however, the pressure in the inlet-main be greater than the pressure it is required to maintain in the outlet-main, the pressure in the expansible chamber will cause the upper plate to rise, and so extend the flexible walls, and raise the sleeve E upon the cylindrical valve-body D. As the sleeve rises, it will cover more or less of the orifices—thus throttling off a certain amount of gas. Should, however, the draught of gas be suddenly increased upon the outlet-main, the plate will immediately fall, lowering the sleeve E, and again allowing an increased flow of gas from the inlet-main C.

Surrounding the lower end of the valve-body D is a fixed sleeve F, by means of which an annular recess is formed around it. This recess may be filled with a lubricant, so that, as the sleeve E descends into and rises out of it, the surface of the valve will be lubricated, and the sleeve E made to slide freely upon it.

APPLICATIONS FOR LETTERS PATENT.

16,952.—Maclaurin, R., "Utilizing the heat from illuminating flames for heating apartments." Sept. 24.

16,954.—Keith, J., "Automatic lighting device for high-pressure incandescent burners." Sept. 24.

16,955.—Keith, J., "High-pressure burners for incandescent lamps." Sept. 24.

16,960.—Thorne, L., "Acetylene generators." Sept. 24.

16,964.—Walter, L. H., "Gas-burners." Sept. 24.

16,979.—Fazan, J., "Generator for acetylene gas." Sept. 24.

17,019.—Milne, J., and O'Connor, H., "Dry meters." Sept. 25.

17,025.—Predmerszky, J. & G., "Acetylene gas generator." Sept. 25.

17,052.—Desq, P., and Francoual, S., "Manufacture of calcium carbide." Sept. 25.

17,067.—Thompson, W. P., "Igniters for gas-engines." A communication from the Victor Motor Company, Ltd. Sept. 25.

17,098.—Llewellyn, J., "Incandescent gas-burners." Sept. 26.

17,101.—Langhans, A., "Manufacturing incandescent media for lighting purposes." Sept. 26.

17,127.—Head, J. H. R., "Valves for gas or other fluids under pressure." Sept. 26.

17,173.—Daniels, J. S. & F. L., "Cooling and condensing apparatus for the treatment of gases." Sept. 27.

17,210.—Sharp, J., "Fluid meters." Sept. 28.

17,217.—Copeland, H. L., "Water-motors." Sept. 28.

17,296.—Hooker, W., "Burners for gas lighting by incandescence." Sept. 29.

17,298.—Potter, W. G., "Acetylene generators and lamps." Sept. 29.

17,324.—Lake, H. H., "Pressure-reducing apparatus." A communication from A. E. Simonds. Sept. 29.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Allowance to be Made for Fast and Slow Meters.

SIR,—As promised in my letter of last week (p. 847), I give below the table of temperatures taken from Mr. F. W. Hartley's book on "Gas Measurement and Meter Testing," to be used for correcting volumes of gas passed through a test holder. I have, however, added 100 to the percentage column in all cases.

The following table by the Astronomer-Royal, published in Parliamentary Paper No. 339 (session 1861) shows the dilatation of gas in contact with water, and saturated with aqueous vapour for given temperatures.

Note.—The table shows the percentage of increase of the volume of gas above its volume at the temperature of 31·4° Fahr.

Temperature in Fahrenheit's Scale.	(Percentage of) Dilatation.	Temperature in Fahrenheit's Scale.	(Percentage of) Dilatation.	Temperature in Fahrenheit's Scale.	(Percentage of) Dilatation.
31·40	100	54·33	105½	74·30	111
33·54	100½	56·24	106	75·94	111½
35·70	101	58·12	106½	77·23	112
37·84	101½	60·02	107	78·81	112½
39·91	102	62·00	107½	80·40	113
42·05	102½	63·77	108	81·94	113½
44·17	103	65·63	108½	83·44	114
46·22	103½	67·43	109	84·88	114½
48·25	104	69·18	109½	86·39	115
50·32	104½	70·90	110	87·83	115½
52·36	105	72·60	110½	89·20	116

I will give two examples showing how to use the table:—

(*a*) Meter reading, 100; temperature, 72·60°
Test holder ,, 95; ,, 54·33°

We can either correct the temperature of the meter by multiplying 100 cubic feet by $\frac{105\frac{1}{2}}{110\frac{1}{2}}$, or we can correct the holder by multiplying 95 cubic feet by $\frac{110\frac{1}{2}}{105\frac{1}{2}}$. The final result will be the same. But as it is convenient to retain the meter reading 100 (or some divisor or multiple of 100), we correct the gasholder—

$$95 \times \frac{100\frac{1}{2}}{105\frac{1}{2}} = 99{\cdot}50 \text{ cubic feet.}$$

This shows that the meter is 0·50 cubic foot fast in 100 = 0·50 per cent.

(*b*) Meter reading, 100; temperature, 52·36°
Test holder ,, 107; ,, 70·90°

Correct the holder, as before, by multiplying—

$$107 \times \frac{105}{110} = 102{\cdot}14 \text{ cubic feet.}$$

This shows that the meter is 2·14 cubic feet slow in 100 = 2·14 per cent.

I have taken the examples as in the book. The confusion therein arises (1) from reckoning the increase of volume from temperature 54·33° to 72·6° as 5 *per cent.* instead of 5 per 105½; (2) calculating on the meter reading, but rectifying the gasholder, which is done to try to counteract the first error; and (3) calculating the final percentage of error by taking the corrected difference in reading *per the gasholder* instead of per the meter, which error was fully dealt with last week. Then the remainder of the chapter is devoted to a very roundabout way of getting the calculations correct for cases where it is admitted to be necessary, but not improving error (3), which is the most serious.

Oct. 4, 1900. B. R. P.

"T. H. C." asks us to invite some correspondents to give their views as to the most profitable modes of utilizing the tar and ammoniacal liquor of a gas-works situated about 30 miles from the nearest port; the make of gas per annum being about 20 millions.

Additional Gas Plant for the Cowes District Council.—At the last meeting of the Cowes District Council, a recommendation of the Special Gas Committee to apply to the Local Government Board for a loan of £1500 for new mains, services, and meters was adopted; and the Council authorized the Committee to take up £1000 of the £2000 already sanctioned by the Board for working capital.

Fatal Gas Explosion in Liverpool.—At Liverpool on Tuesday, Mr. Gibson, Deputy-Coroner, inquired into the circumstances attending the death of William H. Burnham, Manager of a public-house in Park Street, who died in the Royal Infirmary on the previous Sunday from injuries received through an explosion of gas. The widow stated that on the 23rd ult. her husband went to the bar for the purpose of preparing to open the house. A few minutes afterwards she heard a rumbling noise; and on going downstairs saw that the windows of the bar and bar parlour were blown out. Her husband was lying in the parlour suffering from severe burns about the head, arms, legs, and body. He told her that he opened the bar parlour door; and as soon as he did so, he was blown back again. A barman employed by deceased deposed that for the past week or two customers had complained of an escape of gas; but they were unable to detect where it was. A police-constable, who assisted deceased after the explosion, said that Burnham could not account for the explosion, as the gas had been turned off the previous evening. A plumber stated that he had examined the chandelier in the bar parlour, and found a fracture in the ball-joint close to the ceiling. From this there had been a considerable escape of gas; but he did not think it could have been detected by a casual examination. The Jury returned a verdict of "Accidental death."

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. J. BLACKET GILL presiding.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting; and the report and accounts, from which extracts were given in last week's issue, were taken as read.

The CHAIRMAN said he need not occupy the time of the proprietors at any length on this occasion; but they could well imagine that the past six months had been a time of considerable anxiety for everyone connected with the management of gas-works. The cost of coal had been so excessive; and such a rapid rise had very much impeded their efforts. From 1877 to 1890, they only paid for coal, free on board, 5s. 10¾d. per ton, and in 1896 6s. 2d.; whereas this year they had had to pay 16s. Imagine, he said, the very great difference of working under such figures. In these circumstances, it was absolutely imperative that the Directors should increase the price of gas to the consumers; and this, the proprietors were aware, they did last Lady-day, by raising the charge from 2s. 6d. to 3s. per 1000 cubic feet. The consumers, of course, were not particularly well pleased, though really they had enjoyed cheaper gas than certain other parts of London for some time. A deputation, headed by three members of Parliament, waited upon the Board at the Stepney offices, and suggested the desirability of not increasing the price. But the Directors were obliged to point out the fact that the cost of coal had so seriously advanced, that it was absolutely essential they should do so. The increase in the price of gas, it would be noticed, would not clear the coal bill; and while the proprietors were sacrificing ¾ per cent. dividend, something would also have to be taken from the reserve fund. Under these circumstances, the Directors told the deputation they should, as early as possible, be only too pleased to revert to the lower figure for gas; but until the people in the North would let the Company have coal a little cheaper, it was absolutely impossible they could do so. Another cause of considerable trouble to the Board during the half year had been the proceedings in the House of Commons Committee Rooms. As the proprietors no doubt knew, the London County Council introduced a most troublesome Bill for the legalization of the portable photometer; and this engaged the close attention of the Company's General Manager (Mr. H. E. Jones), who had to be assisted by many gentlemen of the long robe for a considerable period. Consequently, he (the Chairman) was told, they had now a bill from their Parliamentary Agents amounting to something like £1200; and this they had to pay for successfully combating such a mischievous measure. He was sorry to hear, on good authority, that the County Council intended to make another attempt; and this merely meant that the Company would have to fight them again. These people did not seem to understand that the cost of doing so must necessarily fall on the consumers of gas, though they themselves employed the rates, part of which the Company had to pay, to fight against them. It was an utter waste of money, and it was a matter that was absolutely unnecessary to pass into law. He might say that through the industry and ability of their excellent General Manager, they had also successfully combated some of the efforts made to raise their rates in the parishes in which they carried on their business; and though the rates were somewhat more—in fact, nearly every time the proprietors met they saw an increase in the rates—still they had come out better than was anticipated; and this, as he had said, was greatly owing to the ability with which Mr. Jones had fought their battles. Another Bill which had been before Parliament was one that Mr. Livesey introduced; and, as the proprietors probably saw, Mr. Livesey had achieved a certain success. In a humble way he (the Chairman) had alluded very often to the ridiculous waste of money involved in providing gas of such high illuminating quality as they had to supply; and he had hoped the time would come when they would be permitted to reduce the candle power. Mr. Livesey had obtained an Act in which he had got the illuminating power of the South Metropolitan Company's gas reduced by 2 candles; but, of course, he had to pay a *quid pro quo* for it, though he (the Chairman) believed Mr. Livesey was quite satisfied with what had taken place. Of course, what the South Metropolitan Gas Company had secured did not apply in any way to the Commercial Company at the present time; and they certainly had no wish to appear in the portals of Parliament until they were obliged to. But what had taken place might possibly have an effect upon the gas legislation of the future; and, if they could only produce 14-candle gas instead of 16-candle gas, he thought it would be a good thing for the Commercial Gas Company. As to the half-year's business, they showed an increase of 6¼ per cent., which was very satisfactory, inasmuch as the Gaslight and Coke Company only had an increase of 3 per cent., though the South Metropolitan Company had the extraordinary advance of 12 per cent. He would not weary the proprietors with a number of figures; but he would simply give the principal ones. The gross income for gas at 2s. 6d. and 3s. had increased, comparing it with the first half of last year, by £20,610; meter-rents by £87; stove-rents by £710; and coin meters and fittings by £149. So that the total gross income for gas and rents showed an increase of about £21,000. So far the figures were very satisfactory. But, on the other side, coal and oil had cost £27,651 more than in the corresponding period of last year. Residuals, however, yielded more by £12,540; so that the net cost of coals presented an increase of £15,111. In short, gas and rents showed a gain of £21,485, and residuals of £12,540, or a total of £34,025. Against this they had to put the loss on coal £27,651, the increase on wages and salaries £2439, on purification £1709, wear and tear £4527, and rates, management, &c., £1800—leaving a net loss of £4125 for the half year. The proprietors knew the dividend must be reduced; and the amount they would require to pay the 12¾ per cent. and 9¾ per cent. dividend, which was ¼ per cent. short of the statutory dividend (for many years past they had kept ¼ per cent. in hand), was £46,610; and they had available £44,229. It followed that they were £2381 short; and this would have to come out of the reserve fund of £43,074, which would reduce it to £40,693, which was a very satisfactory figure. The works were all in good order; and everything was going on satisfactorily. They were putting up another oil-gas plant at Stepney. It was not yet in full working order, but would be shortly.

Then they had had to pay a much higher price lately for lime for purification purposes. The spent lime had been difficult to get rid of; and so they were putting up a lime-burning plant. They believed they would be able to revivify and use the lime over again; and he was in hopes that they would save a considerable sum in this way in future. Coke was selling well; and everything was going on satisfactorily—everything excepting coal. Many people had hazarded prophecies on the question as to whether coal was going to be cheaper next year; but he thought the gentry in the North had tasted so much of the sweets of these high figures that it would be some time before consumers would again see the price of coal down at a reasonable limit. He hoped, however, that by next spring they would get something like easier figures. The present state of affairs had produced this advantage: The price of their stock had not been so high as it used to be, and that was a great advantage, as they could now go into the market and buy again. And a better investment than the stock of the Commercial Gas Company, they could not buy.

The Deputy-Chairman (Mr. W. G. Bradshaw) seconded the motion, which was unanimously carried.

Dividends having been declared at the rates of 12¾ per cent. per annum on the old stock, and 9¾ per cent. on the new stock, less income-tax,

Mr. A. E. Baker proposed a hearty vote of thanks to the Chairman and Directors. He remarked that the proprietors deeply sympathized with them in the anxious duties which had fallen to their lot during the last few months; and they felt the justice of the remarks the Chairman had made upon the Bill of the London County Council. As he had stated, the Company and the ratepayers generally had to pay the rates; and a portion of these rates were taken for the purpose of fighting private companies. Besides having to pay the rates, they had to pay out of their profits the funds required to oppose these deplorable machinations of the County Council. He was glad the Gas Companies had defeated the Council in their present endeavour; but unfortunately they kept repeating their evil practices—not only with Gas Companies, but with many other commercial undertakings of the City of London. He was certain the Directors would continue the good work they had done, and would not leave a loophole through which their antagonists could attack them.

Mr. C. J. Thornton seconded the proposition, which was cordially agreed to.

The Chairman thanked the proprietors for their kind reception of the vote, more especially as the Board had to come before them with a reduced dividend. He sincerely hoped they would soon be in a position to revert to the old rate. He then spoke of the excellent services of Mr. Jones, who had been connected with the Company so many years, as had his father before him. Mr. Jones took such a keen interest in the concern, that they had the fullest confidence in him. A similar tribute was paid to Mr. Ellis; and the exertions on behalf of the Company of Mr. W. Favatt, the Accountant (who, the Chairman said, was their oldest officer), were likewise acknowledged. Concluding his remarks, the Chairman moved a vote of thanks to the officials and staff.

The Deputy-Chairman seconded the motion, which was heartily passed.

Mr. Jones, in thanking the Chairman and the proprietors for their kindness, said that at the present time the management of a gas-works was not exactly a bed of roses. With such a revolution as an increase in the price of coal, as shipped in the North, of 100 per cent. (they now paid 16s. where they used to pay 8s.), the proprietors could imagine that a gas manager's heart was rather appalled; and it did not make it more comfortable when he knew that, at both ends of his district of supply, the local authorities were starting electric light undertakings. It had been perhaps the greatest mortification he had suffered for years to find that, just as two municipal electric lighting establishments were being inaugurated, the Company had to raise the price of gas, and so handicap themselves. But, having looked into the accounts of electric lighting companies, he was glad to assure the proprietors that they too, like the gas companies, had to devote at least one-third of their whole expenditure to the cost of fuel; and therefore, in the coming year, when he saw the electric lighting companies' accounts, he would have the gratification of seeing that they too had had expenses considerably increased. How, in the face of this, they were going to supply, as they pretended they would be able to do in one part of the Company's district, electricity at 1d. per unit, when he had satisfied himself that it cost at Manchester, Glasgow, and several other places where the undertakings were on an enormous scale, and where they were in the middle of coal-fields, more than double this figure (the raw costs were more than double the figure)—how they were going to supply at 1d., he did not know, unless the ratepayers were to forbear, and "fork out" the additional penny. He had the gratification of receiving the other day a letter from one of their gas consumers, who had noticed that, on the heads of the gas bills, he (Mr. Jones) had called the attention of the consumers, or rather he had given them warning not to be led away by any calculations put before them as to the economy to be derived from giving up gas and going over to the electric light. The consumer to whom he referred wrote that he had noticed the caution on the top of the gas account; and he said he could quite endorse the statement. He had extensive shops in the Commercial and the adjoining Gas Company's district (West Ham). He said he had tried both gas and electricity at his two shops, and his electricity bill was two-and-a-quarter times as much as his gas had been before. This gentleman had given him (Mr. Jones) permission to use his name; and if it was asked for, he would furnish it with pleasure. The statement, he should like to say, was made quite voluntarily. He (Mr. Jones) had never seen the writer; at any rate, he was quite certain he had never had a word of conversation with him. But he had sent him this tribute to gas; and he (Mr. Jones) thought it right he should refer to it. Alluding next to the busy times he had had, Mr. Jones said that he had appealed against the rates in nearly the whole of the parishes in the Company's district. They were all determined to put on extra rating; but he was glad to say that in every case (only one of sixteen was unsettled) they had brought them back. If the parishes had succeeded in keeping the rates at the amounts at which they had put them, the Company would have had to spend something like £1300 or £1400 more under that head. Such was the economy, or want of economy, in these districts, that the rates were as much as 8s. 10d. and 8s. 7d. in the pound; while in some parishes in the west of London, they were as low as 5s. 6d. It was to be hoped that, at the municipal elections, gentlemen would get into power who would have regard to the expenditure of the rates, and see whether part of the outlay which was now going on could not be saved. From his own observation, it seemed to him that some of the large paving—unwise paving he might call it—was simply done for the purpose of finding employment for men to get votes, or to benefit the contractors. It was absolutely unnecessary, wasteful, and improvident. It was not done for the best; to do the best, every parish should save expenditure. Concluding his remarks, he said that, having been for 31 years in the Company's service, he had been thinking of a time of rest. But what with the County Council, rates, electricians, and coal, he felt that he must put his shoulder to the wheel harder than ever, and stick to it a little longer, or until the proprietors found that he was worn out, and ought to be put on one side.

Mr. Ellis said he should like to emphasize every word his colleague had said, except the last ones. He was sure the proprietors would not think for one moment that Mr. Jones was worn out, or even getting near that condition. There were many years of good work in him yet, and he was sure Mr. Jones would give them to the Company. On behalf of himself and staff, he thanked the proprietors for their vote.

This concluded the proceedings.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday last week, at the Offices, D'Olier Street, Dublin—Mr. Charles Lawler, J.P., in the chair.

The report and accounts for the half year ending June 30, noticed in the "Journal" last week, having been presented,

The Chairman moved their adoption. In doing so, he remarked that in the six months covered by them there had been sold 25,028,000 cubic feet more gas, for which £2117 0s. 4d. had been received. But the proprietors must bear in mind that by the reduction of 1d. per 1000 cubic feet, which came into operation at the beginning of the year, the Company had lost nearly £3000. The residual products, however, had increased in value. Coke had brought in £2243 more than in the corresponding period of 1899; breeze, £211 more; and tar, £1066 more. But sulphate of ammonia had fallen off to the extent of £117, owing to a smaller quantity having been made. Shareholders and consumers alike were fully aware of the great advance which had taken place in the price of coal. The increased cost the Company would have to pay for the year's supply would be about £60,000. However, they had no alternative to paying it; for they were, like every other gas company, completely at the mercy of the coalowners. They had also to pay a much higher figure for all materials used in the manufacture of gas. To partly meet these increased charges, they were obliged to raise the price of gas 6d. per 1000 cubic feet. This would not nearly represent the additional expenditure for coals, freight, &c.; but the Directors considered it better to await the results of the current half-year's working. They hoped to receive an additional income from residuals, which, when added to the balance they were carrying forward, might tide them over the difficulty. But it was more than probable that it would become necessary to draw a moderate sum from the reserve fund. Prepayment meters continued to be in active demand. There had been an increase of 1327 for the six months; and the total number now in use was 3400. So many applications had been made for them that the staff were unable to complete the orders they had taken, owing to the scarcity of qualified fitters to execute the work; but they hoped after some time to overcome this difficulty. In conclusion, he said the Directors recommended the payment of the usual dividends at the rates of 10½ and 7½ per cent. on the respective shares.

The Deputy-Chairman (Mr. John R. Wigham, J.P.) seconded the motion; and it was unanimously adopted.

The dividends recommended were next declared; and the proceedings closed with a vote of thanks to the Chairman.

THE SOUTH METROPOLITAN GAS COMPANY'S COAL CONTRACTS.

Inaccurate Statements Corrected.

Under the heading of "Gas Coal Contracts and Prices: The South Metropolitan Patronizes Durham Again," the "Financial Times" last Tuesday published an article containing some inaccuracies which it is well should be set right. It will be observed that the information on which our contemporary bases its statements emanates from an "excellent authority" in the North. This and the whole tenor of the article make palpable the intention of the communication. We reproduce the article referred to, and give the true and simple facts at the end.

Our contemporary writes: "When the South Metropolitan Gas Company came on the market last spring for its year's supply of gas coals, prices were so high that the Company decided to purchase only half of its year's requirements. Instead of arranging for something like 1,500,000 tons, the Company bought half that quantity, trusting that, by the end of six months, prices would come down, and enable the Directors to secure the balance on more favourable terms. But the six months have passed; and, as everybody knows, prices have not come down. They have rather risen; and so awkward was the outlook for the South Metropolitan Company during the summer, that Mr. Livesey was tempted to buy some experimental cargoes of American gas coal. This American coal duly arrived; but whether Mr. Livesey and his co-Directors are satisfied with the results obtained from this American coal, we do not know. We do know, however, on excellent authority from the North, that the Company has just been arranging for its required half-year's supply with the colliery owners of Durham. Indeed, by now the contracts have been closed. They cover, we understand, some 750,000 tons, to be shipped to London from October to March; and the prices average about 16s. a ton f.o.b. Tyne. The price is what most other large buyers of gas coal have lately had to pay for forward contracts—indeed, the figure has been paid on several occasions for delivery over the whole of next year—and it is practically the same figure which the South Metropolitan Company paid in the spring for its half-year's requirements. Two deductions seem to be clear from the settlement of these contracts on this basis. One is that

the South Metropolitan Company has been obliged to return to its old source of supply—the county of Durham—and the other is that it has gained nothing by waiting; the contract price now being as high as it was in the spring, when six instead of the full twelve months' supply was purchased. Wherefore it may be assumed (we speak under correction of Mr. Livesey) that the imported American coal has not been a success, and that the Company deems it wiser to stick to the Durham coal. If that be so, we are sorry; for while no one wants to see our gas-works fed with American coal when we have a plentiful supply at home, everybody recognizes that the present 'boom' in prices has been carried to a most mischievous level. Of course, the fact that so large a buyer as the South Metropolitan Company has been compelled to pay the high price of 16s. a ton for its coal, exclusive of the cost of transporting it from the Tyne to the Thames, is convincing proof that prices are going to be high next year; but that much is already understood by coal consumers. It is impossible that a great 'boom' in the coal trade like the present should subside suddenly, unless, indeed, the country were swamped with cheap American coal, of which, considering the rates of freight and the existing labour difficulties in the American coalfield, there is, we fear, not much prospect. But now that the Transvaal war is about over, and that China is ceasing to trouble, less coal will be required by our own and other Governments; and, with a more normal demand, there will in time be more normal prices. Certainly the top has been touched; and though, as shown by the South Metropolitan contracts, prices are still high, and likely to be high for months to come, it is very improbable that they will rise higher."

Now, in addition to some of the statements being incorrect, the subheading which the "Financial Times" gave to the article is, as will be seen, misleading. The facts are simply these: Last spring, the Company made only six months' contracts from April—rather more than half with Durham at 16s. a ton f.o.b.; the rest with Yorkshire, at a slightly lower price. These contracts totalled to some 600,000 tons; leaving rather more than 400,000 tons to make up the twelve months' supply, of which the Company have bought about 386,000 tons of the same contractors at the same prices as in the spring—16s. being the maximum for Durham. Practically all the Durham and Yorkshire contracts have been renewed at the old prices. Two or three contracts, we learn, expire in December. Thus the Company have gained nothing by their struggle; but they have lost nothing. When we say that the Company have gained nothing, we mean in money; for they might have bought for twelve months at exactly the same prices (neither more nor less) as they have now paid. The Company have, however, saved their self-respect; and the Directors have the satisfaction (we can go even further, and say that they do feel it is a satisfaction) of knowing that they did not weakly give the coalowners all they asked for, but have done their best, at, it is true, some considerable risk, to protect themselves from the coalowners' greed. Moreover, by their action, the Directors have found out those of the Durham coalowners—only, we learn with regret, two or three out of a dozen or more—who were disposed to act in a fair spirit; the bulk of them having shown that they cared more for the last 3d. per ton they could exact than for the Company's long, and considerable, connection with them. No doubt the Company will not forget this when their time comes, as come it will; and then dealings will probably take place only on the strictest business principles.

MANCHESTER CORPORATION GAS SUPPLY.

The Testing of Gas-Meters.—Gas Profits and the Relief of the Rates.

At the Meeting of the Manchester City Council last Wednesday—the Lord Mayor (Mr. T. Briggs) in the chair—the minutes of the Gas Committee contained a recommendation to allow gas-fitters an increase of 3s. per stove in the payment made to them for fixing hired gas-stoves for the Committee. Reference was also made to the fact that the Chairman (Alderman Gibson) had submitted to the Committee certain proposals of Mr. N. Bradley, on behalf of the City Justices, on the subject of the testing of meters, and stated that as the present system of testing complied fully with the requirements of the Acts of Parliament, and inasmuch as inaccuracies of registration were of very rare occurrence, and the institution of a more elaborate system of testing would cost the Committee £500 a year, he was of opinion that it was not necessary to carry out the suggestions of the Justices in this matter. The Committee concurred in the opinion of the Chairman, and resolved to leave the matter entirely in his hands to deal with accordingly. The minutes also included a notice given by Mr. Phythian of his intention to move a resolution that a Special Sub-Committee be appointed to consider and report as to the desirability of purchasing a coal mine or colliery for the supply of coal to the Corporation for gas-making and other purposes.

On the presentation of the minutes,

Mr. Shuttleworth drew attention to the paragraph respecting the testing of gas-meters. He said he had previously brought the question before the Council, and thought it was a matter on which they and consumers generally should have some further information. The Chairman of the Committee had stated on a recent occasion that only 425 meters out of 125,000 were proved wrong. This was scarcely an accurate statement, as he found that, on an average, 616 meters were annually found to be wrong; and he knew that recently 30 meters had been tested, and shown to be registering from 25 to 70 per cent. against the consumer. One meter which had been stamped as quite correct was afterwards placed under the Liverpool double test, when it turned out to be 63 per cent. against the consumer. He should be very pleased if the Chairman would take the matter back, and give it further consideration, in the interests of consumers and all concerned.

Mr. Boyle, referring to the increase of 3s. in the payment for fixing stoves, said he did not know what the figure had previously been, but he would like to ask whether the same price was charged for small as for large stoves. It might act as a deterrent, especially to cottagers who might want to use gas-stoves, if the charge was not reduced somewhat for small as compared with large stoves.

Alderman Gibson, in reply, said he could assure Mr. Shuttleworth and other members of the Council that the Gas Committee were as much interested in the question of the accuracy of the meters as anybody else could possibly be. He was quite aware that there was a stricter test in Liverpool than the one adopted in Manchester; and he also knew of the particular case mentioned by Mr. Shuttleworth. In that instance, the cause of the defect was a wrong wheel which had been put into the index; and all the legislation in the world could not prevent mistakes of that kind happening. Liverpool and Manchester were very differently situated in this matter. In Liverpool, the Gas Company had all their meters from one firm, who paid all the expense connected with the testing of them. In Manchester, the Committee obtained their meters from a great number of makers, and had also spent a good deal of money in having them tested. As to the number that were found incorrect, Mr. Shuttleworth only mentioned particular cases which operated against the consumer; but he (Alderman Gibson) could tell them of others which told against the Committee quite in the same proportion. Inasmuch as so few meters comparatively were found to be incorrect, the Committee did not feel justified in spending an extra £500 a year by adopting the Liverpool test. It was not used by any other Corporation than that of Liverpool, and was adopted there because Liverpool did not pay the expense of it. If, however, Mr. Shuttleworth or anyone else could induce gas meter manufacturers to relieve them from this responsibility and payment, the Committee would be glad to have the highest test that could possibly be applied. Under existing circumstances, however, the Committee did not think they would be justified in spending the money. As to Mr. Boyle's question, the Committee some time ago found that it militated against the interests of the gas undertaking to have the gas-fitters charging various prices for fixing gas-stoves, as when they sold a stove to a customer they never seemed to know exactly what it was going to cost for fixing. The Committee consequently made an arrangement with a certain number of plumbers that they would fix these stoves, irrespective of size, &c., at a given figure. This answered the purpose of both parties very well. But, in process of time, the plumbers came and said that this price did not pay them; and it was decided to allow them 3s. more.

The minutes were adopted.

Alderman Gibson, who, as mentioned in the "Journal" last week, had given notice of a motion to the effect that the system of subsidizing the rates out of the profits of the gas undertaking was wrong in principle, unjust in practice, and inimical to the interests of the ratepayers, and should be discontinued, remarked that this matter was an important one, not for himself, but for the ratepayers.

At this stage of the proceedings, however, the meeting was adjourned until the close of the month; when Alderman Gibson's proposal will be duly brought forward for consideration.

THE ALDERSHOT DISTRICT COUNCIL AND THE GAS AND WATER WORKS.

About two months ago, the Clerk to the Aldershot District Council (Mr. W. G. Foster) forwarded to the Directors of the Gas and Water Company copies of resolutions passed by the Council on the subject of the proposed purchase of the Company's undertaking. In reply, the Secretary (Mr. R. W. Edwards) said that the Directors could not sell the concern without the consent of the shareholders; that they had never thought of advising them to sell; and that they could only be induced to consider the subject further on the Council making a very liberal offer on behalf of the town. He added that the Board assumed that the Council had seriously considered the very large sum which, on arbitration, would be awarded to the Company—probably in excess of £500,000. The Gas Purchase Committee of the Council had consulted Messrs. Stevenson and Burstal and Messrs. Blyth, Dutton, and Co. on the question, and, on the strength of their reports, brought up a resolution at the meeting of the Council last Wednesday, expressing the opinion that the statements contained therein justified the Council in "laying the case before the ratepayers, with the view of ascertaining their opinions on the subject." The Chairman of the Committee (Mr. Calvert) moved this resolution; but it was ruled out of order on a question of procedure. As explained by the Clerk, the proper course would have been for the Chairman to give notice of a motion proposing to acquire the Company's undertaking, and, on this being carried, to call a public meeting to sanction the purchase. Mr. Calvert presented a petition, signed by a large number of townspeople, for a public meeting; and this will be called by the Chairman of the Council (Mr. J. May), subject to the ruling of the Clerk on a point of order. In the meantime, the reports of the Engineers and the Parliamentary Agents have been published in the local papers, in order that every ratepayer may be in a position to come to a decision on the question to be submitted to him. The former point out that in any purchase effected by the Council they will have to include the gas-works as well as the water-works, and give the Company "the fair value of their undertakings—such value being ascertained by arbitration, in the event of an agreement not being arrived at." They say the Company would not be the losers by the transfer, and the town could not lose by paying a fair value for the undertakings. Messrs. Blyth consider that if the transfer were sanctioned by Parliament, the price would be fixed at something between 23 and 28 (probably 25) years' purchase of the net earnings; but they remark that there are various matters which would be taken into account by way of increasing or diminishing the price—such, for example, as the relations with the Government and the special arrangements existing between the Company and them. How this would bear upon the price, they say it is not easy to decide; but, of course, if there were any reasonable probability of losing so large a special customer, it would be a point that would be unfavourable to the value. They go on to explain that the costs of obtaining an Act and acquiring the works are defrayed by a loan which is made repayable in 10 years, but that the money requisite to acquire the water-works would be repayable in 60 years, and the money needed for the gas undertaking in 40 years.

Incandescent gas lighting finds favour with the Rochdale Corporation Gas Committee. They have decided to fit up the lamps in about eight streets with Welsbach burners.

At their next meeting, the Birkdale District Council will consider a motion that the Southport Corporation be asked upon what terms and conditions they would be willing to cease the supply of gas to Birkdale after due notice to expire—say, five or seven years hence.

THE GAS FINANCES OF THE BOLTON CORPORATION.

Mr. G. Swainson, the Borough Treasurer of Bolton, has just issued his "Blue Book" for 1900; and a considerable amount of its space is devoted to the finances of the gas undertaking. The quantity of gas consumed during the past financial year increased from 889 million to 941 million cubic feet; but, owing to a reduction of 3d. per 1000 cubic feet made in the price of the illuminant, the receipts were less—viz., £109,007, against £113,580. The decision of the Committee to abolish meter-rents in the extended borough brought the receipts from this source down to £75, as compared with £662 in the preceding year. On the other hand, the residual products realized £39,354, against £26,648; the principal augmentation coming from coke. The fittings trade yielded £150 more than in the previous year. The coal and cannel carbonized during the twelve months cost £54,136, against £43,757; the total expenditure for the manufacture of gas being £77,288, as compared with £64,845. The increase here shown was mainly due to the higher price of coal and cannel. Management expenses showed a rise of £230; while the cost of distributing gas was £200 less, owing to the smaller sum required for repairs and renewal of meters. In dealing with the point as to interest on loans, which last year showed a reduction by £800, Mr. Swainson says this is due to the reduction in the rate of interest; but he adds that, in view of recent announcements and advertisements, it would appear that next year will witness a serious addition under this head. In fact, from one end of England to the other investors are now obtaining considerably higher returns for their money. The sum placed to the sinking and reserve funds differed very little from the previous year; but the profit transferred in aid of the rates went down from £25,000 to £20,000. Owing to the increased price of fuel, the charge for gas has been raised 2d. per 1000 cubic feet, by which means it is hoped that it will be possible to apply in relief of the rates at the end of the year's working the sum of £20,000. The Borough Treasurer gives a table showing what the Gas Department has accomplished within the last thirty years. From this, it appears that the total gross yearly transfers amount to £1,219,088; there has been added to the sinking fund £45,789; carried to the reserve, for renewals, &c., £255,525; the profit voted in aid of the rates is £356,928; and the depreciation debt paid off is £92,745.

DEVELOPMENT OF THE WELSBACH COMPANY'S BUSINESS.

Effect of the Reduction in Price.

In the "JOURNAL" for the 5th of June last, we commented in favourable terms upon the important step taken by the Welsbach Incandescent Gas-Light Company, Limited, in making a very substantial reduction in the prices of their specialities, and remarked that the effect of this concession was to bring the incandescent light within reach of the British prepayment meter consumer, as it had long been to his compeer on the Continent. It was an opening, as we then pointed out, of which no man living could see the end. Four months have elapsed since those words were written; and we are now in a position to judge of the extent to which the public have profited by the opportunity afforded of improving the lighting of their homes by the adoption of the latest system of using gas for illuminating purposes. From a circular just issued by the Welsbach Company, we learn that from the 1st of June (the date of the inauguration of the reduced prices) to the 30th of September the increase in the number of burners and mantles sold, as compared with the corresponding period of last year, amounted to 57 and 55 per cent. respectively. The expansion per month is shown by the following statement: For the month of June, the increase in burners was 17 per cent.; in mantles, 29 per cent. For the two months June and July, the mean increase in burners was 43 per cent.; in mantles, 50 per cent. For the three months June to August, it was 54 per cent. for both burners and mantles; and the figures for the four months are given above. This increased demand exceeds the capacity of the Company's factories at Westminster; and additional premises have been temporarily secured. But to meet the still larger output which, from the foregoing figures, may reasonably be anticipated, as the advantages of the Company's system (at the reduced prices) become further appreciated, it will be necessary to provide entirely new and improved factory accommodation. The Directors are informed by the Managing-Director that many economies in the process of manufacture, which cannot now be effected from want of space, would be possible in buildings erected expressly for the purpose. Having regard to the Company's extensive and growing output, these economies would result in considerable savings on the present cost of manufacture. The expanded trade necessitates increased stock, and the consequent employment of further working capital in the purchase of materials; but as the Articles of Association are at present drawn, the Board have no power to borrow money, on security, from their bankers or others, for the purposes of the business of the Company. Such a restriction makes the conduct of a progressive industrial enterprise quite unworkable; and, in view of the new departure approved by the stock and share holders, the Directors have determined to call them together to sanction the necessary modifications in the Articles giving the Board the usual facilities for borrowing. The new Article has been settled by Counsel, and has been submitted to the proprietors for their approval. The Directors point out, however, that, although authority is sought up to an amount not exceeding £250,000, they do not contemplate that the requirements of the business in the immediate future will reach any such sum. In the arrangements made with the Sunlight Company, power was reserved to the Welsbach Company to redeem the unsecured debenture stock, amounting to £110,000, to be issued in payment for the former undertaking, and the Directors have thought it wise to seek authority for such an amount as would enable them to exercise the option of such redemption, if and when considered expedient, in addition to providing for the requirements of the business. The meeting has been called for the 17th inst., and, in view of the importance of the proposal to be considered, the Directors hope to be strongly supported on the occasion.

A silver medal has been awarded to Messrs. E. Derval and Graham, Morton, and Co., for their exhibit in Class 87 at the Paris Exhibition, which includes the system of inclined retorts shown by the latter firm.

THE LIGHTING AND WATER SUPPLY OF MUNICH.

In the course of a report recently presented to the Foreign Office by Mr. F. D. Harford, Second Secretary to Her Majesty's Legation in Munich, he gives some particulars in regard to the lighting and water supply of the city. As Munich is, he says, probably one of the best-lighted towns in Europe, it is interesting to note that the expense of street lighting in 1898 was £42,500, or about 1s. 10½d. per head; and 25 miles of streets were lighted by electricity, at a cost of £25,947, inclusive of sinking fund expenses, depreciation, &c. Improved incandescent gas-lamps are fitted in all other streets; and whereas the old-fashioned burners used 4·45 to 4·9 cubic feet of gas per hour, yielding only about 12 units of light, the incandescent burners only consume 3·5 cubic feet and give 70 units of light. The gas, electric light, and water supply systems are managed by the Municipality. The Gas Company, who charged more than 7s. per 1000 cubic feet, and paid dividends of 20 per cent., were bought out on Nov. 1 last year; and Mr. Harford says it is a matter for surprise that the Municipality show no sign of reducing this very high charge.

The Municipality have recently compiled a record of the remarkable progress of the city, from a hygienic and sanitary point of view, in the last thirty or forty years, with which the distinguished name of Dr. von Pettenkofer will ever be associated. In 1881, a new system of main drainage came into use; and in 1883 a new water supply was completed at a cost of £300,000. The mortality, which was 40·4 per 1000 in 1871-5, fell to 30·4 in 1881-5, and to 24·1 in 1896-8; so that Munich must now be considered a very healthy town. The water, brought from the mountains, was calculated to supply 300,000 persons with 33 gallons per head per day—that is, at the rate of 114 gallons per second to the reservoir, and at the rate of 200 gallons per second to the town mains. The population has now increased to 450,000; but the supply has been increased to 308 gallons per second of the purest water. The charge is ½d. for 220 gallons, and a minimum rate of £1 16s. a year per house.

At Höllriegelsgereut, on the Isar, a few miles above Munich, are electric supply works, with four turbines, developing 2000-horse power; while provision is being made for a further 4000-horse power. The creation of these works has called into being an entirely new industrial district, which is supplied with light and power by their agency. First of all Sendling was served; and now 21 other localities near Munich benefit by these works, which afford a most interesting object-lesson in showing the means, where the necessary water power exists, of removing factories, workshops, and labourers' dwellings to cheaper and healthier localities outside great cities. Factory chimneys, with their noxious fumes and smoke and unsightly aspect, can then be reduced in number. The experiment of the Isar works has proved a great success, as there are now 90 undertakings of all kinds, including 25 farms, supplied with light and power by them. The owners of many of these works previously sold their valuable buildings and sites in the centre of the town, and bought far cheaper plots, with siding connections with the railway, and built workmen's dwellings adjoining, at great profit and economy in working expenses. In all, there are 151 electro-motors with 1062-horse power, and 21 motors with 267-horse power in course of erection, besides which 13,500 incandescent lamps and 329 arc lamps are supplied with electric current. A steam-engine of 1000-horse power is held in reserve. The electric cables measure 56 miles, with 30 miles of secondary distributing cables. The Isar works are operated largely by turbines, with reserve steam-engines, with an elaborate system of regulators according as the river is high or low. During some recent floods, the accumulators were under water for some days, but continued to give out current.

MR. W. ARNOTT ON "COAL AND ITS PRODUCTS."

A copy of the "Cape Daily Telegraph" recently to hand contains a report of an interesting lecture on the above subject delivered by Mr. W. Arnott, Manager of the South African Lighting Association, Limited, before the Literary Section of the Port Elizabeth Institute. He began by describing the composition of coal, and then went on to refer to the quantity of the mineral annually produced in Great Britain. He quoted figures to show how this had increased from 170 million tons in 1889 to 188 millions in 1894 and 220 millions last year; while in the same years America raised 48, 152, and 205 million tons, and Germany's output went up from 35 to 130 million tons. Though the British output has not quite doubled since 1870, the exports have more than trebled. The citation of these facts led Mr. Arnott to touch upon the question of putting a prohibitive *ad valorem* duty—say, 50 per cent.—on coal sent out of the country, except when its destination is one of the British Colonies; and he seemed to favour the idea. He next indicated the classes into which coal is divided—viz., (1) anthracite, (2) bituminous steam coal, (3) lignite or brown coal, and (4) gas-producing coal or cannel—and dealt with each at length; samples being held up for inspection. By means of diagrams, he showed that though England may fairly claim to possess some of the principal known coalfields in Europe, coal exists in all parts of the world; the greatest deposits of the mineral being those of North America. There are also extensive coalfields in China, Australia, and New Zealand.

Coming to the part of the world which is for the present his home, Mr. Arnott went on to show that South Africa, in its rich and wonderful mineral wealth, is not behind other countries is the matter of coal; the coalfields covering a fairly symmetrical area, embracing many parts of Cape Colony, the Orange River Colony, the Transvaal, Natal, and the whole of Basutoland. The greatest length and breadth of the coalfield contained within the boundary line are 5000 and 2000 miles respectively; and its area is about 56,000 square miles. Workable seams of coal have been found, and are being worked along the extreme edges of this vast basin, in Stormberg, near Molteno, at Indwe, in Natal, and in the Transvaal. With the exception of these few places, this extensive coal area or basin is practically unexplored, and unknown as regards its mineral resources. Up to the present, its fringe has just been touched in a few isolated and far distant points; and it appears to be certain that further systematic researches will be rewarded by the discovery of great stores of mineral fuel, capable of supplying the wants of South Africa for many generations. The coal measures in this area are all 1000 feet thick.

Doubtless this thickness will be found to vary considerably from point to point; the coal changing in quality—in some places anthracite and in others semi-bituminous. Mr. E. J. Dunn, the well-known geologist, addressed a very important report to the Cape Government this year on the subject of the coal formation in the Karoo. After examining certain mines at Vereeniging, he says: "I can now state absolutely that the magnificent coal seam worked at Vereeniging, ranging from 6 to 15 feet thick, and averaging 9 feet of coal—superior to any hitherto worked in South Africa—rests upon the Dwyka conglomerate. This means that from Middelburg in the Transvaal to Beaufort West there is practically an unbroken line of coal near by. The whole of the Free State is underlaid by this coal system, part of Natal, a great deal of the Transvaal, and a large portion of Cape Colony. From these lower measures, workable coal is likely to be found within reasonable distance of East London, Port Elizabeth, and Cape Town; and the quality, if that exposed in faulted localities is any criterion, is probably not inferior to the best Welsh steam coal." Mr. Arnott remarked that the opening up of this source of fuel would convert Table Bay into a first-class port and naval station of the premier order. Mr. Dunn suggests that the Government should offer a bonus of £10,000 for the first seam of coal cut within the boundaries of Cape Colony and below the Karoo. The lecturer dealt at length with the formation of South African coals; pointing out that the majority are of subaqueous origin. Natal possesses some fine coal-fields, which, however, are not worked to the extent they might be. The best coal sent out from Natal is from the Dundee mine, but up to the present the supply has not been equal to the demand.

On the subject of the future of the coal supply, Mr. Arnott expressep the opinion that, when our present resources fail, we shall have to look to Japan, India, and China, in which there are large deposits of coal, for help, though doubtless some better means of generating power, and of more economically using it, will then have been discovered. He thinks the Celestials will be the coal kings of the future. They are already awakening to the fact that they hold in their grasp untold wealth in the shape of coal, and are making preparations to take greater advantage of the treasure which Nature has bestowed upon their country.

The concluding portion of the lecture was devoted to the products resulting from the distillation of coal for the manufacture of gas. Mr. Arnott emphasized the fact that, much as we know of these products, a good deal more may be learnt; and he said if there was one mineral more than another that could afford interest and pleasure to the student, it was coal. Diamonds, gold, and precious stones must all give way to it.

A hearty vote of thanks was accorded to the lecturer.

ELECTRIC LIGHTING NOTES.

The Wigan Corporation have resolved to apply to the Local Government Board for power to borrow a further sum of £16,500 for electric lighting purposes.

The number of lamps connected to the Canterbury Corporation electric lighting system on May 31, 1899, was 3475; at the end of the following August, it was 5151; and by Aug. 31 this year, it had risen to 9216. In view of this substantial growth, the Resident Engineer has advised an extension of the plant; and Mr. R. Hammond has been requested to report on the matter.

The Electric Lighting Committee of the Hereford Town Council have settled accounts with the contractors for the electric lighting installation. The cost of land, erection of buildings, laying of cables, &c., amounted to £20,470. The original estimate was £20,000; and the increase is accounted for by cable extensions. The present installation represents the equivalent of 6822 8-candle power lamps, together with the equivalent of 684 lamps for the motor and lights at the works. So far, applications for 500 lights have been received.

The annual accounts of the borough of St. Helens (Lancs.), just issued by the Borough Treasurer, show that the total income on the revenue account of the Electricity Department was £5196, including £3420 from the sale of electricity, and £1409 for traction power to the St. Helens Tramway Company. The expenditure (including £1719 for generation of electricity, £318 for distribution, and £626 for management) amounted in the aggregate to £5185; leaving a "balance profit" of £10—£10 12s. 7d. to be more exact, which (according to one of the local papers) "is considered eminently satisfactory, and an augury of the large profits which may be expected from the sale of electricity in the future."

We suppose the York City Council ought to be congratulated upon the results of the working of their Electric Lighting Department during the past six months; but the figures in a paragraph that has reached us appear to be either deficient or they require a little further explanation. The paragraph states that, at the meeting of the Council on Monday last week, Alderman Dodsworth said the members would be pleased to know that the Electric Lighting Committee had during the past six months made a trading profit of upwards of £200. After the interest and sinking fund was paid, it would leave about £100. It was very satisfactory; and in the next six months, he said, they would show a very good profit. Are we to understand from this that at York £100 is sufficient for interest and sinking fund for six months?

The chief item on the *agenda* at the meeting of the Oldham Town Council last Wednesday had reference to a proposal of the Electric Light Committee to apply to the Local Government Board for sanction to borrow £157,000 for the purpose of erecting, at Greenhill, a station for the supply of electric energy both for lighting and power and tramway purposes. It was stated by Alderman Harrop, the Chairman of the Committee, that the old station was started in a state of fear for the purpose of keeping companies out of the town, and not for the love of the work. The present site was very cramped, inconvenient, and expensive. Seeing the success of the work, the Committee thought it best to start in an adequate way; and they would provide for the next 20 years by the system now proposed. The price for the current was one of the lowest in the country; being 3·41d. for lighting, and 3·39d. for other purposes. The total of the various estimates for the electric extension amounted to £156,510. The necessary resolution was passed.

Fuse-boxes in the pavements of Hull are causing annoyance to some of the tradesmen; and a few days ago a deputation waited upon the Electric Light Committee of the Corporation on the subject, which has on several occasions been under their consideration. One speaker said the complaint against the boxes was that they were a nuisance, because of the number of people who lounged about them. He understood that the boxes could be placed underground, and he thought this should be done—at all events in the busy commercial thoroughfares. They had no wish to hamper the work of the Committee, but they contended that the convenience of the traders should be considered. Another speaker said his establishment had a frontage of only 16 feet to the main street, and out of this a space of 4 ft. 6 in. was obstructed by a fuse-box and a pillar letter-box. Another member of the deputation said the fuse-box which was opposite his windows had to be cleansed every morning from the impurities received in the night, and during the day it was the venue of loafers, who made offensive remarks about the passers by. Other speakers followed with arguments condemnatory of the present position of the boxes. The Chairman (Mr. Skinner) said the Committee would make personal inspection of the localities named, and consider what could be best done to remove the cause of complaint.

The Dudley Corporation are desirous of adopting "free-wiring" in connection with their electric lighting undertaking; and for this purpose they have applied to the Local Government Board for sanction to borrow £10,000. Consequently Mr. H. Percy Boulnois visited Dudley last Friday to hear evidence on the matter. The Consulting Engineer is Mr. R. P. Wilson, and, in the course of his evidence, he stated that the Corporation were going to charge 6d. per unit for two hours per day, and 1½d. per unit for the remaining twenty-two. Dudley would be the first place in England where so low a price as 1½d. per unit had been charged. At present they were only supplying current for the tramways; the charge being 2d. per unit for the first 150,000 units, and one-tenth of a penny less for every additional 50,000 up to 400,000 units. The tramway to Stourbridge had been at work a year, during which the consumption had been 196,000 units; and they anticipated a consumption of 270,000 units with the electric lighting. He quoted Hanley, among other places, with the view of showing the consumption had largely increased after the adoption of the free-wiring system, which absorbed the whole of £10,000. To cite Hanley was an unhappy choice, as only two or three weeks since Mr. Boulnois heard some other particulars about the working of the Corporation concern there which did not altogether speak well for its past financial management.

Paradise Street, Liverpool, is not exactly the kind of place that its name implies. It contains, among other places of business, an electricity generating station, which is a positive terror to the tradesmen and other residents in the locality, through its "emission of calcined soot or unburnt slack." The tradesmen, it is asserted, can only keep their doors open at the expense of having their goods covered with the black deposit. The street and pavements are constantly strewn with it, and it is blown into the premises, causing much damage to provisions and other eatables. Gutters and rain spouts are continually being choked up; and several of them have already been broken down—one gutter falling through a roof, fortunately at night time. Alderman Walker is one of the sufferers; and he states that he recently spent £20 to £30 in cleaning his roof and spouts, and in less than a week about 1 cwt. of the deposit had collected. Besides this, an almost constant stream of water is discharged across the pavement; and as there is no channel, it spreads to a great extent. No wonder that the ratepayers and property owners in and round about Paradise Street are desirous of having this nuisance abated. On Monday last week, a deputation waited upon the Ward representatives; and they promised to bring the matter before the City Council. Such a serious nuisance as this would not have been allowed to continue if the generating station had been owned by a private individual.

Sir William Preece, the expert appointed by the Maidstone Town Council and approved by the Local Government Board, has reported on the electric lighting scheme for that town. He urges the Council to retain the Fair Meadow as the site for the generating station, and to select another unobjectionable site for the dust destructor. He estimates the income from electric supply at £5000, and says the cost of the working should not exceed £2500. He is quite sure the undertaking will be self-supporting and successful. He, however, takes one important exception to the scheme. The streets, he says, are now so well lighted, and at such a cheap rate, by the Welsbach incandescent mantles, that he questions very much the advisability at first start of adopting glow lamps to replace the gas-lamps. It is proposed to fix 32 arc lamps and 119 glow lamps. There is no question of the advantage of arcs; but it is different with the glows. They are not so brilliant as the incandescent gas, and cost much more. It has been found necessary to fix two 32-candle power lamps to compete with the Welsbachs. Maidstone pays £2 18s. 6d. per lamp per annum for gas. But it will cost £6 per annum to light equally with glows; and the satisfaction given will not be commensurate with the extra cost. Sir William recommends the Council to leave out the glow lamps for the present, and to extend the arcs. He says they could, on their estimate, supply 16 more arcs, and give much greater satisfaction.

The Leeds City Council last Wednesday adopted a proposition of Alderman Wigram, the Chairman of the Lighting Committee, that application be made for permission to borrow £510,500 for electric lighting and power purposes, including therein £177,573 already sanctioned by the Council. Speaking upon his motion, the Alderman pointed out that, since the acquisition of the electricity undertaking by the Corporation, the Committee had been bound to incur increased expenditure to develop electric lighting in the city. Those who had lately followed the proceedings of the British Association would realize of what urgent importance the production of electricity for lighting purposes had now become. The Committee had to look to the provision of electricity throughout the whole of the city. The proposed expenditure would, of course, have to be spread over a considerable number of years. Speaking roughly, it included £100,000 for general extensions; £80,000 of this being for the extension of the main line which passed through Wortley, New Wortley, Armley, Bramley, and on to Stanningley. It also covered the cost of crossing the river, and extending up to Hunslet in a westerly direction. It was intended to spend £140,000 for the extension and provision of new buildings, and the supply of extra machinery at Britannia Mills. Alderman Wigram added that the sum the Committee asked for was very large; but there was satisfaction in the belief that the business would be profitable.

Last Wednesday, the West Bromwich Town Council had before them the report of the Electric Lighting Committee, in which they recommended that the charge for electricity for lighting purposes should be at the rate of 6d. per unit until an equivalent of 100 hours of maximum

demand had been reached each quarter, and thereafter during the same term at the rate of 2d. per unit; that the charge for electricity for power purposes should be at the rate of 3d. per unit until an equivalent of 78 hours' use of the maximum demand had been reached in each quarter, and thereafter during the same term at the rate of 1d. per unit; that the "free-wiring" system be adopted; and that application be made to the Local Government Board for sanction to borrow £10,000 for providing materials and labour for wiring houses, and also for the purchase and fixing of motors. The report gave rise to a discussion, in the course of which the Mayor (Alderman S. Pitt) said the Committee had considered the question of electricity from a commercial standpoint, and they had come to the conclusion that the charges were such as would make the undertaking a profitable one. It was their intention to supply current as cheaply as possible, and also to see that proper precautions were taken in the wiring of houses, so that nothing injurious might result. According to their scale, the more electricity used, the cheaper it would be. Mr. Bushel wished to know what the actual expense to the consumer would be, and also asked for a comparison of the cost of electricity with that of gas. He urged that the average charge made by corporations throughout the kingdom was 2½d. per unit; and he failed to see how West Bromwich could commence with a minimum charge of 2d. The Mayor said if electricity were taken for power purposes, customers would have four hours at a cost of 1½d. per unit, which would be equal to gas at 10½d. per 1000 cubic feet. If they took two hours for light at 4d. per unit, it would be equal to gas at 2s. 4d. The Committee calculated that, with an increasing demand and a supply of no less than 300,000 units per annum for the trams, they would be able to adhere to the charges they had made. The report was approved.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Meeting was held at the Company's Offices, St. Helen's Place, E.C., on Thursday last—Colonel A. R. M. Lockwood, M.P., presiding.

The Secretary (Mr. I. A. Crookenden) having read the notice calling the meeting,

The Chairman said he thought that the report which he had to place before the meeting would be received with interest, both by the proprietors and the public at large. Dealing with the accounts, he referred with satisfaction to the substantial increase in the water-rates, amounting to £9612, as compared with the corresponding period of last year. Having regard to the large expenditure of capital which was now taking place, they all naturally looked forward to an increase in the water-rates. A very considerable proportion of this expenditure was for the construction of reservoirs, to meet an increasing demand; and it also constituted an insurance against droughts. But in other respects, mains, engines, and similar works were necessary to meet the wants of the rapidly increasing population supplied by the Company in their parliamentary area. Of course, the outlay on these works became immediately income-bearing. It was curious to notice in this connection—and it was a fact which the proprietors must carefully bear in mind, having regard to possible events in the near future—that the percentage of profit on the existing capital did not equal that for the year 1886, when the sinking fund was forced upon the Company by a Committee of the House of Commons—a proceeding which had been unequivocally condemned by every unbiassed authority since. In Midsummer, 1886, for instance, the percentage of profit on the total capital raised available for ordinary dividend, was 2·70, while that for Midsummer, 1900, was 1·93 only; thus proving the contention which the Company made before the Committee in 1886—that the new capital spent in storage reservoirs, and in the necessary mains and works to supply scattered and straggling districts, could not possibly pay the proprietors at the same ratio as the capital expended up to 1886 in the central parts of the area of supply. And if this were so, the whole case on which the imposition of the sinking fund was based fell to the ground. There was no great variation in the other items of the revenue account, except, perhaps, that of "pumping and engine charges, including the cost of coals, wages, &c.," which stood out with unpleasant prominence. As they were all aware, coals during the period under review had greatly increased in price; and he did not think that it would be possible for the Directors, or for the great Railway Companies, to predict exactly the course which the Coal Market would take in the ensuing two years. With regard to the item "Salaries of Engineer and clerks, &c.," the decrease shown of £2400 was only apparent. It was a matter of account; part of the charges under this item having been very properly transferred to the capital account. In the management section, the proprietors would observe that, upon the whole, the expenditure was rather less than in the corresponding period of last year. Turning to the credit side of the account, the substantial increase of water-rates to which he had alluded would be seen; and the other item of a satisfactory nature was the sum written off for losses and bad debts. The loss from bad debts only amounted to £528, out of a charge of upwards of £192,000. Of the £4000 set aside to meet sums written off from all causes, there was a balance of £340 to carry over. So far, therefore, he thought that the accounts and balance-sheet would be considered fairly satisfactory; the unappropriated balance carried forward being nearly £4000. With respect to the future, the Directors had visited the works; and the assurance contained in the report, that everything was in good condition, and that the works were proceeding satisfactorily, was the outcome of their survey, and was fully confirmed by the Company's Chief Engineer, Mr. W. B. Bryan. Regarding increased business, the new services laid on during the half year were not quite so many as in the corresponding period of last year; but the Company now had a total of 207,655 supplies, which was greater than the Grand Junction, the West Middlesex, and the Chelsea Companies combined. The proprietors could therefore imagine that the Directors, in conducting the affairs of the Company, had their hands pretty full. It might be interesting to note that the average water-rate per house on the new supplies was £1 4s. 3¾d., or exactly 1d. less than the average for the new houses laid on up to Midsummer, 1899. It must be a source of gratification to them all that, in the Committee of the House of Lords on the East London Company's Bill, wiser counsels obtained this year than last, and that the measure was favourably reported to the House, and the Royal Assent given to it on the 6th of August. It was greatly to be wished that the obstruction and opposition to which the Company had been subjected for so many years might, under the *ægis* of this last Act of Parliament, cease, and that the Company might be allowed to pursue the great work of providing water to a population already numbering 1,375,000 souls, and increasing at the rate of 40,000 per annum. If justice and fairness were thus meted to the Company, the Directors would look with confidence to its future development, stability, and value. He might state, although the subject did not come properly within the period ended at Midsummer, that the Bill introduced by the Lea Conservancy, the principal features of which he explained at the last meeting of the Company, was passed unaltered by a Committee of the House of Lords. Both the New River Company and themselves protested most strongly against such a violation of agreed terms, but without effect; and the measure would come into operation in January next. Having expressed great regret at the retirement from the Board, through the state of his health, of Mr. Herbert Dalton, after 34 years' services to the Company, the Chairman concluded by proposing a resolution for the adoption of the report and accounts, and the declaration of a dividend at the rate of 7 per cent. per annum, less income-tax, on the ordinary stock, for the half year ended Midsummer last.

Sir Herbert Barnard seconded the motion, which was carried unanimously.

An Extraordinary General Meeting was subsequently held.

The Chairman proposed a resolution for raising the sum of £24,000, by the creation and issue of sufficient debenture stock for the purpose, under the provisions of the Metropolis Water Act, 1899, and of the consent of the Local Government Board given on May 17 last; and for authorizing the Directors "to issue such stock on such terms and conditions, at such times, and in such manner, consistent with such provisions and consent, as they may deem expedient."

Sir Herbert Barnard seconded the motion, which was carried unanimously.

The Chairman afterwards stated that the new reservoirs were proceeding very favourably, and that the Engineer was satisfied with the progress made with the works. Up to the present, the Company had not had to buy any water; and they had a satisfactory stock on hand.

The proceedings terminated in the usual manner.

MANCHESTER AND THE THIRLMERE WATER SUPPLY.

The Second Pipe-Line.

On Thursday last, about seventy members of the Manchester City Council went to Thirlmere to witness and take part in the ceremony of laying the first length of the second pipe-line to convey the water of Thirlmere to Manchester. In 1894, when the Thirlmere works were opened for the supply of the first instalment of 10 million gallons a day, the total average quantity of water delivered to the entire district was about 25 million gallons. From that date, owing to the improved system of distribution since the water from Thirlmere was introduced into the city and the growing demand for trade and domestic purposes, the consumption has largely increased; being, on the average of the present year, about 32½ million gallons per day—an increase at the rate of 30 per cent. on the consumption in 1894. The scheme which was commenced on Thursday consists of tunnels and "cut-and-cover" work of about 50 miles in length, and pipes for a further distance of 45 miles, covering the distance of 95 miles between Thirlmere and Manchester.

The ceremony of laying the first of the second line of pipes was undertaken by the Lord Mayor (Mr. Thomas Briggs) on the invitation of the Water Committee; and for the purpose, his Lordship was presented with a silver mallet and level. The Lord Mayor, in accepting the gifts, said he considered there was no city in the United Kingdom which had a better water supply than Manchester. The first contract for the commencement of the Thirlmere works, which included the tunnels through Dunmail Raise, Nab Scar, and Moor How, was let in December, 1885. The works for the supply of the first instalment of 10 million gallons a day were completed and opened on Oct. 12, 1894, having occupied in construction nearly nine years. At that date, the consumption of water was about 25 million gallons a day; but, owing to the improved system of distribution when the Thirlmere water was brought to Manchester—which resulted in a much greater pressure in certain districts—the consumption commenced at once to increase greatly; and in 1895 it had reached 28,750,000 gallons a day. Since that date, there had been almost a continual growing annual increase; the average quantity now supplied being about 32½ million gallons, or 50 per cent. increase since 1894, when the works were opened. The population supplied was above 1,100,000. The area of supply was about 30 square miles, and included, in addition to the city, 24 adjoining townships supplied in detail, as well as the supplies in bulk. It was satisfactory to be able to state that, notwithstanding the large expenditure incurred in carrying out these works, amounting to about £2,750,000, no addition had been made to the rates or the charges for water. On the other hand, the Water Committee had, within the last two years, been able to afford relief in the reduction of rates and charges for water to the extent of about £35,000 a year. It had now become necessary to prosecute with vigour the laying of the second pipe-line in connection with the aqueduct. The estimated cost of this work would be from £400,000 to £500,000. The greater portion would consist of pipes, 44 inches in diameter, and between Middle Hulton and Prestwich (about thirteen miles), they would be 40 inches in diameter. The water would be delivered into the existing reservoirs at Prestwich. The complete scheme when the five pipes were laid, was estimated to yield 50 million gallons a day.

The Lord Mayor then lowered the first pipe by means of blocks and chains, and, with the aid of the mallet and level, declared it to be "well and truly laid."

Luncheon was subsequently served at Rigg's Hotel, Windermere Sir John Harwood presiding. In the course of the after speeches, Mr. G. H. Hill, the Chief Engineer, mentioned that it would be some four or five years before the works in connection with the new pipe were completed. If the city continued to prosper at the same rate as at present, they would want the third pipe in about ten years' time.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The announcement I make will be calculated to cause many managers to prick up their ears, and wish they were in Glasgow. "By instructions of the Magistrates, Sir James Marwick (Town Clerk) has called the attention of the Gas Committee to the fact that the illuminating power of the gas supplied from Dawsholm during the last week of August, and from all the three gas-works during the first week of September, was under the statutory minimum." How happy would many a man be were all the penalty he had to pay for allowing the illuminating power of the gas to drop a point or two, the having of the attention of his Committee called to it. Yet there is common sense in this. To begin with, there may be a satisfactory explanation of the circumstance; but, more than that, to have attention called to the fact will be sufficient to ensure that it shall not be repeated. I commend the gentlemanly Glasgow method to the section of the London County Council who regard the portable photometer as the cure-all in the matter of illuminating power. A courteous letter reduces the remedy of the portable photometer to a species of quackery. This Glasgow intimation will be equally as effective—perhaps more so—as would be an appearance before a police magistrate; and it does not stain the reputation, nor hurt the feelings, of men who are not common felons. Would that all were as reasonable as are the Corporation of Glasgow.

The Dundee "Gas Scandal" has been much in evidence this week, in the pages of the newspapers—there are two, a morning one and an evening one—which have been working up the incident. It is almost amusing to observe how the other local newspapers affect to be unaware that there is such a subject being agitated. Every day during the week there have been letters or articles in the newspapers that discovered the "Scandal," which have not shed much light upon it, and might, without loss to anyone, have been left unpublished; but then it was necessary to keep the ball rolling. The subject was before the Town Council on Thursday, when Treasurer Ritchie, the head of the department which is implicated, made a statement with regard to it. His explanation consisted of an endeavour to justify the practice of "use and wont." As such, it was lame—as, indeed, it must be, for there can be no justification of the practice of making any charge retrospective. While this is so, the point raised is a small one, and is not worthy of the ado which is being made over it. As I remarked last week, it only affects a very few in the community. Treasurer Ritchie says that 176 consumers have asked rebates; but it has to be remembered that all of these are not in the position of leaving the town, or being otherwise so placed that they could prove that they had been, or would be, prejudiced by the arrangement of the Commissioners. The affair, taken as a whole, has a "worked-up" appearance about it, probably in view of the municipal elections. Even in this case, however, it ought not to be possible that it could ever happen again. A little inconvenience might be occasioned, in connection with the bank account; but it is in every way safer to face that, and to make increases or reductions in price prospective, rather than to give offence even to the least of the gas consumers. A letter signed "A Ratepayer" makes me feel glad that I inserted the saving clause in my "Note" last week, as to the truth of the statement that rebate was being given down to the 20th of June. This is not being done; and the person who wrote that he had received it, now admits that he did not. The incident is only another illustration of the truth, which should never be lost sight of, that very little reliance is to be placed upon anonymous letters in newspapers.

There is a class of persons who are *par excellence* the grumblers of the universe. These are the Trades' Councils everywhere. They seem to live in a perpetual atmosphere of suspicion of everybody. They are always ready to run tilt against any constituted authority, upon the slightest pretext; and, as a rule, their zeal in seeking to right a wrong is in proportion to their ignorance of the subject. The high price of gas in Dundee has had this usual effect upon the Dundee Trades Council; and they have written to the Town Council asking that an investigation should be made into the reason why gas is dearer in Dundee than in other towns. The letter was remitted to the Gas Committee. It may be taken for granted that the Trades Council will not be satisfied by any explanation which the Gas Committee may give, and so perhaps the better policy would be to ignore the letter altogether.

A melancholy circumstance has come to light in Dumfries. I mentioned several weeks ago that the late Clerk and Treasurer to the Commission—Mr. J. Herries—had left a will in which he bequeathed his whole estate to the Gas Commissioners, and that the Commissioners, in the belief that Mr. Herries' relatives had more right to the estate than they had, renounced their claim to it. It now transpires that Mr. Herries committed suicide in a loch at Lochmaben, to which he rode upon his bicycle for the purpose. I understand that he weighted himself, went into the water, and shot himself several times. This was a sad ending to a life which all along had been outwardly regular and honourable; but it is more sad to learn that there are defalcations in his books. This week it was reported to the Gas Commissioners that there was a deficit in their books of £969 11s. 10d. Of this sum, £200 had been recovered; and the Commissioners hold a fidelity guarantee for £100, which they claim. They are also to claim against the estate of the deceased. According to the report of a Committee, Mr. Herries kept duplicate gas-rental sheets; and but for a writing off of £200 in the ledger, for which there was no entry in the books, the practice might have been continued without detection. The Commissioners have resolved to request Mr. T. M'Lintock, C.A., of Glasgow, to examine the books, and to recommend another system of book-keeping.

At a time when the doings of the gentlemen whom workmen call their leaders are causing such widespread concern among gas managers, it is appropriate to state their demands upon the Aberdeen Corporation Gas Committee. The other day a deputation representing the employees at the Corporation gas-works waited upon the Committee, with the view of presenting a petition for an increase of wages. Mr. William Blackwood spoke on behalf of the deputation, and submitted eleven points for the consideration of the Committee. In the first place, the men asked for an advance of 6d. per eight-hour shift; that potmen be put on a level with

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 890.

Issue.	Share	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	**GAS COMPANIES.**			£ s. d.	£			p. c.	**GAS COMPANIES.**			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin Consumers'	18¾–19¼	..	5 7 8	60,000	5	Sept. 28	7	Ottoman, Ltd.	5–5½*	..	6 7 3
100,000	10	..	7½	Do. 7 p. c.	13½–14½	..	5 3 5	500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds	102–106	..	5 13 2
800,000	100	July 2	5	Australian 5 p. c. Deb.	101–103	..	4 17 1								
200,000	5	May 16	6	Bombay, Ltd.	6–6½	..	4 12 4	851,070	10	Apl. 27	7	River Plate Ord.	10½–11	..	6 7 3
40,000	5	..	6	Do. New, £4 paid	4–4½	..	5 6 8	250,000	Stk.	June 28	4	Do. 4 p. c. Deb.	99–101	..	3 19 8
880,000	Stk.	Aug. 15	12	Brentford Consolidated	245–255	..	4 14 1	250,000	10	Sept. 28	8	San Paulo, Ltd.	11–12*	..	6 13 4
270,000	..	..	9	Do. New	177–182	..	4 18 11	185,000	Stk.	Sept. 14	10	Sheffield A.	234–239	..	4 3 8
50,000	..	..	5	Do. 5 p. c. Pref.	140–145	..	3 9 0	209,700	..	..	10	Do. B.	234–239	..	4 3 8
159,375	..	June 14	4	Do. 4 p. c. Deb.	116–120	..	3 6 8	447,427	..	..	10	Do. C.	232–237	..	4 4 5
220,000	Stk.	Sept. 14	10	Brighton & Hove Orig.	220–230	..	4 6 11	5,641,885	Stk.	Aug. 15	5½	South Metrop., 4 p.c. Ord.	128–133	+1	4 0 10
926,320	..	..	7	Do. A. Ord. Stk.	150–160	..	4 7 6	1,520,000	..	July 12	3	Do. 3 p. c. Deb.	94–97	..	3 1 10
1,009,500	Stk.	Aug. 29	5	Bristol, 5 p. c. max.	117–118	..	4 4 9	380,940	Stk.	May 16	5	Southampton Ord.	110–115	..	4 6 11
420,000	20	Sept. 28	10	British	39–41*	..	4 17 7	70,825	..	July 12	4	Do. 4 p.c. Deb.	117–122	..	3 5 7
50,000	10	Aug. 15	12	Bromley, Ord. 10 p. c.	24–26	..	4 12 4	120,000	Stk.	Aug. 30	6	Tottenham A. 5 p.c. and B. 3½ p.c.	112–117	..	5 2 7
79,000	10	..	9	Do. 7 p. c.	19–21	..	4 5 8	250,520	..	..	4½		80–85	..	5 5 11
500,000	10	May 16	6	Buenos Ayres (New) Ltd.	8¾–9¼	..	6 9 9	61,550	..	June 14	4	Edmonton 4 p. c. Deb.	111–115	..	3 9 7
220,000	Stk.	June 14	4	Do. 4 p. c. Deb.	98–100	..	4 0 0	182,380	10	Jan. 12	5	Tuscan, Ltd.	7–8	..	6 5 0
150,000	20	July 12	8½	Cagliari, Ltd.	23–25	..	6 12 0	149,900	10	July 2	5	Do. 5 p. c. Deb. Red.	98–102	..	4 18 0
100,000	10	Sept. 28	8	Cape Town & Dis., Ltd.	13½–14½*	..	5 10 4								
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54–56	..	5 7 2								
550,000	Stk.	Apl. 11	13½	Commercial Old Stock	270–280	..	4 16 5								
236,425	..	..	10½	Do. New do.	205–215	..	4 17 8								
288,237	..	June 14	4½	Do. 4½ p. c. Deb.	133–138	..	3 5 3								
800,000	Stk.	May 31	9	Continental Union, Ltd.	173–178	+6	5 1 1					**WATER COMPANIES.**			
200,000	..	..	7	Do. 7 p. c. Pref.	170–175	..	4 0 0	780,404	Stk.	June 28	11	Chelsea, Ord.	300–305	..	3 12 2
51,600	Stk.	—	14	Croydon A 10 p. c.	—	..	—	150,000	..	..	5	Do. 5 p. c. Pref.	155–160	..	3 2 6
178,400	..	—	11	Do. B 7 p. c.	—	..	—	160,000	..	..	4½	Do. 4½ p. c. Pref. '75	143–148	..	3 0 10
555,000	Stk.	Aug. 15	5½	Crystal Palace Ord. 5 p. c.	115–120	..	4 7 6	175,785	..	Sept. 28	4½	Do. 4½ p. c. Deb.	143–148*	..	3 0 10
60,000	..	..	5	Do. 5 p. c. Pref.	130–135	..	3 14 1	1,720,560	Stk.	Apl. 11	7	East London, Ord.	195–200	+2	3 10 0
486,090	10	July 27	11	European, Ltd.	19–20	..	5 10 0	654,740	..	June 14	4½	Do. 4½ p. c. Deb.	147–152	..	2 19 3
354,060	10	..	11	Do. £7 10s. paid	14–15	..	5 10 0	797,687	..	..	3	Do. 3 p. c. Deb.	96–98	..	3 1 3
14,993,075	Stk.	Aug. 15	4 1/10	Gas-light 4 p. c. Ord.	99–101	+1	4 7 2	700,000	50	June 14	7½	Grand Junction 10 p. c. max.	107–110	..	3 8 2
2,600,000	..	..	3½	3½ p. c. max.	92–94	..	3 14 6	310,000	Stk.	Sept. 28	4	4 p. c. Deb.	130–135*	..	2 19 3
8,799,735	..	..	4	and 4 p. c. Con. Pref.	114–117	..	3 8 5	708,000	Stk.	Aug. 30	14	Kent	295–305	..	4 11 10
3,993,975	..	June 14	3	Coke 3 p. c. Con. Deb.	93–95	..	3 8 2	160,000	..	..	7	Do. New, 7 p. c. max.	200–210	..	3 6 8
70,000	10	May 31	8	Hongkong & China, Ltd.	13½–14½	..	5 10 4	1,043,800	100	June 28	10½	Lambeth, 10 p. c. max.	292–297	+5	3 10 8
3,800,000	Stk.	May 16	10	Imperial Continental	208–213	+1	4 13 11	406,200	100	..	8	Do. 7½ p. c. max.	205–210	..	3 16 2
473,600	Stk.	Aug. 15	8½	Do. 8½ p. c. Deb. Red.	99–101	..	3 9 4	350,000	Stk.	Sept. 28	4	Do. 4 p. c. Deb.	127–130*	..	3 1 7
75,000	5	June 14	6	Malta & Medn., Ltd.	4¾–5¼	..	5 14 3	500,000	100	Aug. 15	14	New River, New Shares	408–413	−2	3 7 10
560,000	100	Oct. 1	5	Met. of 5 p. c. Deb.	105–108*	..	4 12 7	1,000,000	Stk.	July 27	4	Do. 4 p. c. Deb.	128–133	..	3 0 2
250,000	100	..	4½	Melbourne 4½ p. c. Deb.	104–106*	..	4 4 11	902,800	Stk.	June 14	7½	South-wark Ord.	195–200	+1	3 15 5
541,920	20	May 31	3½	Monte Video, Ltd.	10¾–11¼	..	6 1 8	126,500	100	..	7½	7½ p. c. max.	185–190	+3	3 18 11
667,946	Stk.	Aug. 30	9½	Newc'tle & Gatesh'd Con.	210–215	..	4 6 1	489,200	Stk.	..	5	and 5 p. c. Pref.	155–160	..	3 2 6
299,855	Stk.	June 28	3½	Do. 3½ p. c. Deb.	104–107	..	3 5 5	1,019,585	..	Apl. 11	4	Vauxhall 4 p. c. A Deb.	139–134	..	2 19 9
150,000	5	May 16	8	Oriental, Ltd.	7¼–7¾	..	5 3 8	1,155,066	Stk.	June 14	10	West Middlesex	274–279	..	3 12 2
135,000	5	..	8	Do. New, £4 10s. pd.	5¾–6¼	−¼	5 15 3	200,000	..	..	4½	Do. 4½ p. c. Deb.	140–145	..	3 2 1
15,000	5	..	8	Do. do. 1879, £1 pd.	1¼–1½	..	4 11 5	200,000	..	Sept. 14	3	Do. 3 p. c. Deb.	97–99	..	3 0 7
				*Ex. div.									*Ex div.		

stokers, in addition to the present advance asked; that assistant potmen receive the shilling that was taken off their wages recently; that the minimum wage for shed and yard men be 23s. per week of 51 hours, time-and-a-half for overtime, and every day to stand by itself; that purifier men be paid at the rate of 6d. per hour; that season men be paid double time for all holidays they work; that when retorts are drawn or charged by machinery, 40 retorts be the limit per hour for each machine man; that double time be paid for Sunday labour, and all unnecessary Sunday labour be abolished; that when barrowmen are barrowing, they have no coke to drown or trim in the yard; that should these conditions be granted, no extra work shall be put upon the men; and that boilermen be put on the same level as the barrowmen, in addition to the advance asked. The deputation, after stating their views, thanked the Committee for receiving them. The Committee said they would consider the petition; and the deputation then withdrew. There is certainly no lack of audacity in these claims; and I fear the worst of the matter is that Aberdeen is not by any means singular in respect of the attempt to stir up the men in the gas-works to agitate for impossible conditions of labour.

In Hamilton, also, the stokers have made a demand for an advance of wages. At a meeting of the Town Council this week, the Manager (Mr. W. Ewing) reported that he had made inquiries as to the wages and conditions of labour of stokers in other towns, and had received replies, from which it appeared that the stokers in the gas-works at Hamilton were in a better position than those in other places; and the Gas Committee recommended that the men be requested to put their applications in writing, and to state their reasons for making them. Mr. Meechan, who seems to be a pro-labour man, disputed the statement that the stokers were in such a good position; and he pointed out that in Motherwell, for instance, the hours and the wages were the same as in Hamilton, but that the retorts in the Hamilton works required 4 cwt. of coal, whereas in Motherwell they only required 2½ cwt. Mr. MacHale, the Convener of the Gas Committee, pointed out that this was not so, but that, while Motherwell was the only town that could be compared with Hamilton in the matter of stokers' wages, the retort charging in both towns was the same, and there were other essential differences which were in favour of Hamilton. Mr. Meechan complained of Sunday labour in the works. Mr. MacHale undertook to do all he could to dispense with Sunday labour. Mr. Meechan then withdrew his opposition; and the recommendation of the Committee was adopted.

After considering the subject for seven years, the Corporation of Hamilton have this week agreed to proceed with the erection of sulphate plant in the gas-works. The order has been placed with Messrs. Ernest Scott and Co. The business was not agreed to with unanimity, as in the Hamilton Corporation there is a standing opposition to the Gas Committee. Mr. Tainsh, who headed it on this occasion, specified other two firms, one of whom would do the work for £720, and the other for £400; and he asked if they were to expend five times more than the thing was worth because someone had an idea in his head. Mr. MacHale explained that the Committee had recommended the firm they did because they believed that with their process there would be an absence of nauseous smells. The opposition then gave way.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 6.

Sulphate of Ammonia.—The market has been somewhat irregular; but, on the whole, a shade easier—the closing quotations being £10 10s. per ton f.o.b. Hull and Leith, and £10 12s. 6d. to £10 13s. 9d. f.o.b. Liverpool. There has been a considerable amount of reselling, at below makers' quotations, in the home market, and abroad at a still further discount. Prompt orders have, in fact, been largely covered in this way; and at the close available supplies in makers' hands are more abundant than they have been for some time. For delivery ahead, makers maintain a firm attitude; and the forward market has consequently been mainly in the hands of speculators. For delivery up to the end of the year, there are sellers f.o.b. at spot prices; and sales are reported abroad at below the equivalents. For spring months, however, there is more caution; and a substantial premium would have to be paid.

Nitrate of Soda is quiet at 8s. 1½d. to 8s. 3d. per cwt., according to quality, on spot.

LONDON, *Oct.* 6.

Tar Products.—Business has been a little irregular during the past week; benzol inquiries not being so much in evidence. Most makers, however, are very fully committed until the end of the year at old rates; and very few are participating in the improvement that has occurred during the past two or three months. Carbolic acid is steady; and the same may be said of crystals. There is a little better inquiry for tar oils; but these are still offering at low and unremunerative rates. Pitch shipments are now in active progress. Anthracene is dull; but naphthalene in its various forms is moving off freely at old rates.

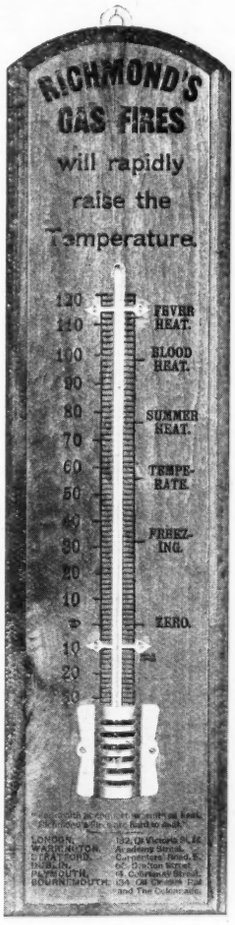
The week's quotations average out as follows: Tar, 15s. to 22s. Pitch, east coast, 37s.; west coast, 33s. Benzol, 90's, 10½d.; 50's, 1s. 1d. Toluol, 1s. 3d. Solvent naphtha, 1s. 3d. Crude naphtha, 4¼d. Heavy naphtha, 1s. Creosote, 1¼d. to 2d. Heavy oils, 3d. Carbolic acid, 60's, 3s. Naphthalene, 70s. Salts, 45s. Anthracene, nominal, "A" 4d.; "B" 2½d.

Sulphate of Ammonia is neglected. No new business is offering; but makers, generally speaking, are well sold. Sulphate is now getting out of parity with nitrate; the latter article being strong for forward delivery. The average value in all positions may be taken at £10 10s. per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—With a continued sufficiently good demand for all descriptions of round coal to prevent any material accumulation of stocks, prices are being well maintained at late rates. House fire descriptions, although not in pressing request, are moving away fairly well, considering the large amount of buying which went on two or three months back; and coalowners are unable to put down anything like the quantities they are anxious to secure so as to provide for winter



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requirements. At the pit mouth, best Wigan Arley is firm at 16s. 6d. to 17s. 6d. per ton, Pemberton four-feet and seconds Arley 15s. to 15s. 6d., and common house coal 14s. to 14s. 6d. The lower qualities of round coal, although perhaps not in more than moderate demand for inland requirements for steam, forge, and general manufacturing purposes, are still in brisk request for shipment, with the result that all descriptions of round coal are moving away freely at full prices—12s. 6d. to 13s. per ton at the pit being about the minimum figures for inland slack, with 16s. 6d. to 17s. being obtained for steam coals, delivered at the ports on the Mersey. The chief difficulty of colliery proprietors is still with regard to engine fuel, plentiful supplies of which are hanging on the market; and prices are perhaps not being quite so well maintained as in round coal. Some improvement (which is looked for as probable) in the cotton trade, would no doubt tend to relieve the situation; but, on the other hand, there is a probability of quietude in the coke-making industry which would throw a good deal of slack on the market. Taking the position all through, the outlook for slack tends rather towards weakening prices. For the present, Lancashire collieries still quote 11s. to 11s. 6d. per ton at the pit for the best qualities of slack, with common or fine screened slacks obtainable at 9s. to 9s. 6d.; but there are surplus lots from outside districts offering at low figures, which consumers are picking up to keep them going from hand to mouth, rather than contract for supplies at present rates. In hard cokes for furnace purposes, prices continue to tend steadily downwards.

Northern Coal Trade.—The coal trade shows already the diminution in the demand for the Baltic and the northern ports generally, and its effect more especially on the trade of Northumberland. Steam coals are decidedly weaker, and may now be quoted at from 18s. to 18s. 6d. per ton f.o.b. for best Northumbrian qualities, 17s. 6d. for second kinds, and from 10s. 6d. to 11s. for steam smalls; while for forward deliveries, there is a lower range of prices quoted. In the gas coal trade, there is considerable activity. Shipments on the long contracts are now very heavy, and so take up a considerable part of the large output that the Durham gas coal collieries are making. For occasional cargoes, the price quoted for best gas coals varies from 17s. 9d. to 18s. 6d. per ton f.o.b.; and the contracts usually are at about 16s. Coke is a little weaker, as far as export qualities are concerned. Best Durham coke is 30s. per ton f.o.b.; while blast-furnace coke is about 27s. at the Teesside furnaces. Gas coke is steady in price, though there is an enlarging output. The f.o.b. quotation is from 24s. to 25s. per ton; but there are quantities delivered on contract at lower prices.

Scotch Coal Trade.—There is little change to record, except a continued decline in the exports. The home demand is strong, which is chiefly due to the fact that coal stores are everywhere low. It is the cheaper varieties which are most in request. The prices quoted are: Main 15s. to 15s. 3d. per ton f.o.b. Glasgow, ell 16s. to 17s., and splint 16s. 9d. to 17s. The shipments for the week amounted to 244,332 tons—a decrease of 10,940 tons upon the previous week, but an increase of 56,991 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,241,018 tons—an increase of 1,596,112 tons over the same period of last year.

Developing the Lincoln Water Supply.—Mr. E. A. S. Fawcett held a Local Government inquiry last Tuesday at Lincoln, regarding an application by the City Council for sanction to borrow £16,000 for purposes of water supply. The Deputy Town Clerk (Mr. W. T. Page, jun.) explained that the Corporation were empowered to supply Lincoln, Bracebridge, Boultham, Greetwell, Canwick, and the County Asylum with water. The average daily requirement was from 1½ to 1¾ million gallons; the maximum being about 2 million gallons. It was, he said, as much as the Corporation could do to meet present requirements from existing sources in the dry season. To obtain a further supply, it had been decided to bore for water; and they now asked for the sanction of the Local Government Board to an expenditure of £16,000 for the work. Their borrowing powers for water-works purposes were £85,000; and a Provisional Order obtained in 1871 gave them power to borrow an additional £50,000—£135,000 in all. Of this they had actually raised £105,000; but a good deal of the money had been repaid. He hoped that the Board would agree to the money being borrowed for a period of 50 years. The Water Manager (Mr. Teague) stated that the present pumping capacity was about 2 million gallons per day, and there was a steadily increasing demand. Replying to the Inspector, Mr. Page said they would be glad to cut off the other sources if they obtained a sufficient supply from the more reliable ones. Mr. Percy Griffith, the Engineer in charge of the boring operations, said the proposed boring was the largest that was practicable; but, in his opinion, nearly 1½ million gallons daily would be obtained from it. After further evidence, the inquiry closed.

Kingsbridge Water Supply.—A new scheme for obtaining an additional supply of water for Kingsbridge is under the consideration of the District Council. Two schemes which had reached the Provisional Order stage have been balked by the requirements of the Local Government Board. In the first case it was proposed to obtain water from springs on a local estate known as Borough; but this had to be withdrawn because the Board insisted upon the Corporation acquiring, in addition to the 8 acres of land required for the works, and extra 150 acres upon which it was suggested pollution of the water might arise. The original estimate of the cost of the scheme was £6000; but the additional land would have raised it to £25,000—a quite prohibitive sum for so small a town. A second scheme was then prepared, the essential feature of which was the damming of a small brook at Place Moor, a few miles from Kingsbridge. No difficulty was experienced; and the scheme, which was estimated to cost £13,000, was apparently in a fair way to furnish a solution of the Council's difficulties, when the Local Government Board intimated that, as it was proposed to intercept a stream, the Public Health Act required that the consent of the riparian owners must be obtained. It was pointed out to the Board that the scheme would not "injuriously affect" the owners, as contemplated by section 332 of the Public Health Act. But the Board were obdurate; and as it was considered impossible to obtain the consent of all the owners to the scheme, it had to be dropped. In the new scheme, which has been prepared by Messrs. Taylor, Sons, and Santo Crimp, it is proposed, as in the last, to obtain a supply from Place Moor; but it is not intended to interfere with the flow of the stream. It will be a gravitation scheme; and its cost is estimated at £9900.

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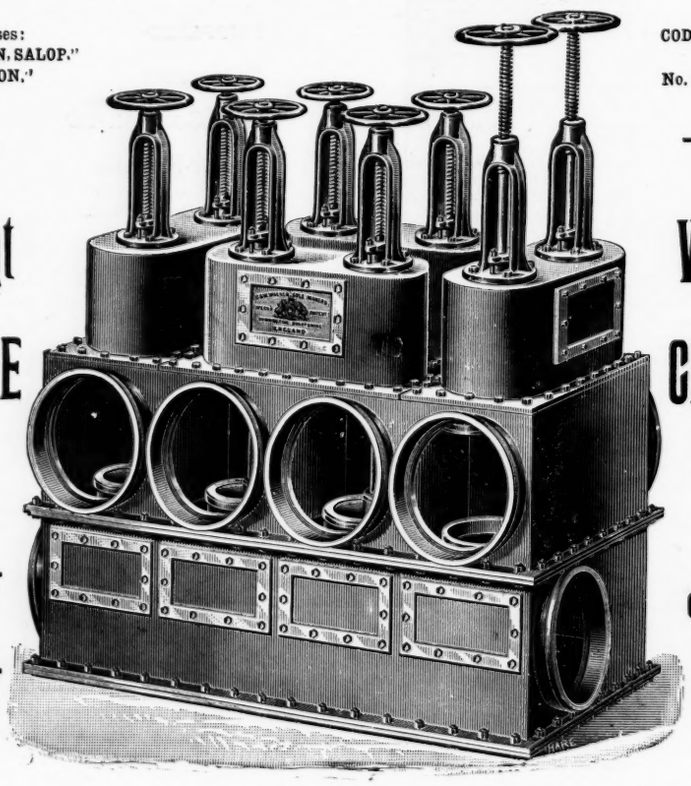

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New Water Supply Scheme in the Malton District.—A special meeting of the Malton Rural District Council was recently held to consider a new scheme of water supply for Slingsby and the "street villages" between that place and Malton. Mr. Hornsby, of Hovingham, submitted a plan for obtaining water for all the villages by gravitation from the same source as that from which the Gilling and Stonegrave water supply is procured. Mr. Hopkins, of Grimstone Manor, the owner of the spring, had promised the use of the overflow water and the necessary land for £20 a year; and Sir William Worsley had offered to allow the pipes to be taken through his land free of charge, on condition that a few cottages near Hovingham are supplied from the main. The new scheme met with general approval; and a Committee was appointed to consult with the Engineers.

Okehampton Water Supply.—The Local Government Board have at last approved the scheme for obtaining an additional water supply for Okehampton, and given their consent to the raising of a loan to carry out the work. The scheme provides for tapping the head waters of the Reddaven; and it will bring in an entirely independent supply. It was at first proposed to carry the pipes through certain land leased to the War Office. But as difficulties arose with the authorities, an alternative route was proposed; and it is to the latter that sanction has been obtained. The Board recommended that consideration should be given to the question of filtration, in order that the quality of the water might be improved, and security afforded in the event of accidental contamination. The Council have decided to act upon the recommendation. The notices rendered necessary by the alteration in the line of pipes have been served; and the work will probably be proceeded with at once, and finished before next spring.

Registration of Plumbers.—At the last quarterly meeting of the Worshipful Company of Plumbers, a copy of a memorial to Mr. Balfour was laid before the Court, calling attention to the desirability of the Government dealing with the registration of qualified plumbers in the interest of the public health. It bore the signatures of Lord Aberdeen, Sir C. Cameron (Medical Officer of Health, Dublin), the Lord Provost of Aberdeen, Professor W. R. Smith, of King's College, London, Professor M. Hay, of the Aberdeen University, and other chief officers of the Congress of the Royal Institute of Public Health held at Aberdeen, and about 600 delegates and members representing sanitary authorities, architects, colleges, hospitals, school boards, and other bodies in various parts of Great Britain and Ireland. It was reported that the following resolutions were passed at the Tenth International Congress of Hygiene and Demography held in Paris: (1) "That all plumbers' work, as much in the supply of drinking water as in the removal of soil or slop water, should be the object of particular attention; and that the pipes for the distribution of water, as well as the hydraulic apparatus (reservoirs, syphons, &c.) and the down-pipes for slop water, should be completely protected from frost." (2) "That a professional education, with a test examination before obtaining a diploma, should be demanded of sanitary plumbers, with a view to spreading among plumbers a knowledge of hygiene, and of rational and economic construction in their work."

The Protection of Water Areas.—The Gas and Water Committee of the Hull Corporation have decided, on the advice of their Medical Officer of Health, to acquire certain land, rather more than 55 acres in extent, at a cost of about £10,215, so as to form a protective area for their waterworks undertaking.

The Water Finances of the Bolton Corporation.—In the volume of statistics just issued by the Borough Treasurer of Bolton (Mr. G. Swainson), to which reference is made in another part of the "JOURNAL" to-day, he shows that the water-rental in the past financial year rose from £59,018 to £61,233. On the other hand, the cost of maintenance of the works increased from £5934 to £7134. The total expenditure was £62,654, against £62,873; and the amount transferred to the borough fund was the same as before—£15,000. The sum of £14,000 was spent on capital account during the year; the principal item being £9000 for the extension of mains.

Sales of Shares.—Mr. Reeves recently disposed of some £20 shares in the Whitstable Gas Company, at prices ranging from £35 10s. to £36 per share; and some fully-paid £10 shares at £17 10s. and £18 each. At the Yarborough Hotel, Grimsby, a few days ago, Mr. D. Brocklesby sold 15 original shares of £10 each in the Cleethorpes Gas Company, at £21 15s. per share; and 19 new shares of similar nominal amount at £16 2s. 6d. to £16 7s. 6d. At the Mart, Tokenhouse Yard, last Wednesday, 4000 preference shares (£10) in the Dorking Water Company, bearing interest at the rate of 5 per cent. per annum, were sold by Messrs. White and Sons at an average price of £12 each. At an auction sale at Cambridge on the same day, £200 of original consolidated stock in the Cambridge Water Company realized £300 and £298 per cent.; and five £10 shares (£4 paid) produced £56. Last Friday, Mr. Henry Knowles offered for sale by auction £5000 of 5 per cent. consolidated ordinary (new) stock of the Gloucester Gas Company, at prices ranging from £122 10s. to £125 per £100 of stock; the total amount realized being £6193 10s.

The Water Supply of South Essex.—The water supply in South Essex appears to be in an extremely critical position, judging from statements made at last Tuesday's meeting of the Essex County Council. Mr. H. E. Brooks said that the failure of the Bills introduced by the South Essex Water Board and by the South Essex Water Company left them, in the district around Grays, no nearer any scheme for supplying the wants of the growing population than they were before. He hoped the County Council would pay particular attention to this subject, and that if, as was likely, further action was taken either by local bodies or by the South Essex Water Board to increase the water supply, the Council would not ally itself, as it did at the last meeting, with the opponents of the scheme of the Water Board. Alderman Russell also spoke of the great necessity for improving the water supply in the district named. Unless something was done, he said, they might possibly have a catastrophe worse than the one at Maidstone. On the proposal of Colonel Howard, it was agreed that a Joint Committee of the Parliamentary and Sanitary Committees should inquire into the general conditions of the water supply of the county.

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The Transfer of the Clay Cross Water-Works to the District Council.—The purchase of the Clay Cross Water-Works by the District Council was completed on the 29th ult., at the offices, at Chesterfield, of Mr. R. T. Gratton, the Water Company's Solicitor. The transfer was sanctioned by the Act passed last year; and the parties agreed to a sum of £14,000 as the price; the Council undertaking to discharge a mortgage of £1000, and pay £100 towards the expenses of winding-up the Company.

Cirencester Gas Company.—At the annual general meeting of this Company on the 29th ult., the Directors reported that there had been an increase of 1,621,700 cubic feet in the quantity of gas sold in the year ending the 30th of June, chiefly owing to the extended use of stoves and prepayment meters—the latter now numbering 300. The total revenue was £8467; and the expenditure, £5989—leaving a balance of £2478. After deducting the interest on debentures, &c., and the interim dividend paid in April last, the sum available for distribution was £1450. The Directors recommended the payment of the statutory dividends of 10, 7, and 5 per cent. on the different classes of shares. This would absorb £875, and leave £575 to be carried forward. In consequence of the extraordinary rise in the price of coal, amounting to 5s. 6d. per ton, and to the prospective difference in cost to the Company over that of last year of at least £1000, the Directors had been compelled to raise the price of gas 6d. per 1000 cubic feet.

Sulphur in Cheltenham Gas.—The Cheltenham Town Council had before them last Wednesday the proceedings of the Lighting Committee, who on the 26th ult. received a report from the Gas Examiner, calling attention to the fact that on four occasions during the month the sulphur in the gas had greatly exceeded the maximum allowed by the Company's Act (25 grains); the average being 33·03 grains. The Committee decided to send a copy of the report to the Directors of the Company, and ask what explanation they had to offer; the further consideration of the matter being adjourned pending their reply. The Mayor (Alderman G. Norman), in submitting the proceedings for confirmation, remarked that the results shown by the tests of the gas in the past month were without parallel in his experience; the nearest approach to them being those of May, June, and July of last year, when the average was 23 grains. In June, 26 grains were reached. On that occasion, the attention of the Company was called to the matter; and, seeing that the average for September was 33·03 grains, or 8 grains higher than the limit, and that on one day it went above 41 grains, he thought the Committee could not have done otherwise than again invite the Company to offer an explanation, and to give some assurance for the future. When the Company were before Parliament, the Council tried to have the sulphur limit made 20 grains; but it was fixed at 25 grains. He could not but believe that some explanation would be forthcoming. He knew that the Company, which was under very able management, had some awkward circumstances to meet at present; but, now that gas was being consumed in so many cottages in the town, and was also largely used for cooking purposes, it was doubly important that the quality should be kept up. The Committee's proceedings were confirmed; and so the matter remains for the present.

Local Authorities as Colliery Owners.—Among the other authorities who have considered, or are considering, the question of becoming the owners of a coal mine or mines is the Bradford Corporation. At to-day's meeting, the members will be invited by Mr. E. R. Hartley to consider the following resolution: "That, in the opinion of this Council, it is desirable that the Corporation should have control of the supply of coal required by the Corporation for use in their various undertakings, and that it be an instruction to the Town Clerk to insert in the Bill to be promoted in the next session of Parliament a clause empowering the Corporation to become the owners of and to work a colliery or collieries, with power to borrow the necessary moneys required."

Sheffield Gas Company and their Workmen.—The "Sheffield Independent" is informed that for some time past the workmen in the various departments of the Sheffield Gas Company's works have been discontented with the wages paid; and the result of inquiries is said to have satisfied them that, in proportion to the work performed, their pay is below what workmen receive in similar occupations in Leeds, Manchester, Birmingham, and towns of similar size. They further urge that house rents, coal, and gas have become dearer, and, as their labour is the only commodity they have to sell, they consider that they are bound to raise its price to enable them to meet these extra charges. The men have held a number of meetings, and have agreed upon what they consider should be a minimum advance in each department. Their requests have been forwarded to Mr. Hanbury Thomas, the General Manager of the Company, with a view to their being laid before the Directors. The men, through their Secretary (Mr. C. Brain), ask for an interview, in order that the various matters may be discussed.

Further Gas Loan for the Wigan Corporation.—At the monthly meeting of the Wigan County Borough Council last Wednesday, Alderman Holmes, in moving the confirmation of the minutes of the Gas Committee, called attention to the amount the Committee desired to borrow for the gas undertaking. He said that the Council would remember that on the 6th of January last year, the Corporation made application to the Local Government Board for power to borrow £19,626. On the 11th of February following, the Board replied that the available margin of borrowing powers under the Provisional Orders of 1888 and 1893 was £5000. On the 15th of February application was made to the Board for power to borrow £5000 for new mains, services, and other absolutely necessary works; and it was stated that the Corporation would apply for an Order increasing their borrowing powers for gas-works purposes. On the 16th of May a local inquiry was held into the application to borrow £5000. On the 14th of July the Board issued their sanction to transfer £5000 for other purposes. On the 3rd of August application was made for a Provisional Order to increase the borrowing for gas-works purposes; and on the 11th of July this year the Board's Provisional Orders Confirmation (No. 2) Act, 1900, authorized the Corporation to borrow such sums as might from time to time be required for gas-works purposes. The motion having been carried, Alderman Holmes moved that application be made to the Local Government Board for their sanction to the borrowing by the Corporation of £25,000 for the purposes of the gas undertaking; and this was agreed to.

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Gas-Engine Explosion at Dumfries.—On Saturday, the 29th ult., a gas-engine exploded in the works of Mr. J. Burns, aërated water manufacturer, Dumfries. Damage was done to the amount of about £200.

Gas Explosions.—A fire broke out in the People's Palace, Sunderland, on the night of Saturday, the 29th ult.; but thanks to the prompt action of the Manager and his staff, a panic was averted. A gas-pipe which runs round the circle had been kicked through, and one of the audience throwing down a lighted match fired the escaping gas. A flame sprang up and set alight the woodwork in front; but the outbreak was soon quelled.—The military quarter of Canterbury was startled at about one o'clock last Wednesday by a loud explosion of gas in the house of Mr. J. Iddenden, of Union Street. The front room of the house was completely wrecked, and the window blown out; a boy being cut about the head. It is reported that the explosion was caused by a gas-works employee searching for a leakage with a lighted match in an adjoining house.

The Public Lighting Question at Oakengates.—In the "JOURNAL" for the 25th ult., it was mentioned that the District Council of Oakengates had decided to adopt oil for the public lighting of the town, in consequence of the advance made by the Gas Company in their price. The incident was regarded as a retrograde action on the part of the Council; and the correspondent of a local paper, it may be remembered, burst into poetry on the subject. Probably the same bard has again delivered himself of a ballad supposed to be sung by the Council to the air, "Give me back my Heart again," and commencing—

Give us back our gas again;
We go groping through the dark,
Grant us sunshine after rain;
To our supplications hark.

The Company reply, in verse, to the effect that they will do so, but at their own price; and they inform the Council that they will find this cheaper than oil. As a matter of prosaic fact, the Council are now asking to be supplied with gas "on the Company's own terms."

Northwood (Isle of Wight) Water Supply.—At the last monthly meeting of the Newport Town Council, the Water Committee reported that the Local Government Board had sanctioned the Corporation supplying the parish of Northwood with water; and Mr. Rich, the Chairman, stated that they were in a position to provide an efficient service. In connection with this, the Board sanctioned a loan of £10,500 for a new reservoir and an extension of mains, on the distinct understanding that at the end of five or six years a separate rising main should be provided from the pumping-station to the reservoir. Mr. Salter objected to the Board granting the loan without an inquiry, and brushing the ratepayers on one side by not allowing them to have a voice in the expenditure of the money. Mr. Rich said the opinion of a practical man and the Board was that the proposed reservoir would be none too large. At the present time they had only a six hours' supply; but when the scheme was carried out he hoped they would have a three days' service. The Mayor (Mr. G. B. Purkis) said he believed the Board sanctioned the loan without an inquiry, because the Council had entered into a contract with the Rural District Council to supply Northwood with water.

Cardinal Wolsey's Water-Works for Hampton Court Palace.—The Kingston Town Council have received a letter from the Office of Works stating that the supply of water from the Coombe springs to Hampton Court Palace has been abandoned by the Crown, and that they are prepared to hand over to the Corporation the old plug-house and certain pipes and culverts under streets in the borough. The offer has been accepted. The supply from the springs to the Palace was established by Cardinal Wolsey, who laid the pipes.

Wey Valley Water Company.—At the fourth ordinary general meeting of this Company on Monday last week, the Directors reported that up to the 30th of June last an allotment of 1859 shares had been made, and they trusted the proprietors would increase their holdings in the Company, as further capital was required to pay for the works in hand. The revenue receipts in the districts supplied showed, after deduction of working expenses, a profit sufficient to pay a dividend for the half year at the rate of 1 per cent., which the Board recommended the proprietors to declare. The Engineer (Mr. A. C. Pain, J.P.) presented a report upon the progress of the works. The dividend recommended by the Board was declared.

A Doctor Cuts Off a Water Supply.—At the South-Western Police Court, last Thursday, Dr. Dewar, of Sloane Street, appeared before Mr. Rose in answer to a summons taken out at the instance of the Wandsworth District Board of Works, for neglecting to provide a water supply to premises at 46, Grafton Square, Clapham, of which he is the owner. Mr. W. W. Young supported the summons. The defendant, according to his own admission, stopped the supply in order to rid himself of an objectionable tenant, who had refused to leave the house notwithstanding the fact that proper notice had been given to him. The doors and windows had been taken out, but still the tenant remained. In order that he might be removed forcibly, the defendant asked his Worship to grant an order for the closing of the house. Mr. Young objected, and said the Board could not be made an instrument for the removal of objectionable tenants. Mr. Rose refused to adopt the Doctor's suggestion, and made an order for the supply of water to be restored.

West Gloucestershire Water Company.—This Company during the half year ending Sept. 1 connected an additional 273 services; making the total number of houses and property supplied 7559, which, with £150 rent of properties, &c., are estimated to produce an annual income of £7374. Extensions of the mains to Almondsbury and Whitchurch have been completed; and new pumping plant at Frampton wil be finished shortly. Since the last meeting of shareholders, 653 fully-paid shares have been disposed of at a premium of 30s. As to the financial results of the half-year's working, after paying all working expenses and interest on debenture stock, there is a net profit of £2151, which, together with the £104 brought forward from the last balance-sheet, makes a total of £2255 to the credit of the revenue account. At the meeting of the shareholders last Saturday week, the report (from which these particulars are taken) was adopted; and a dividend at the rate of 4 per cent. per annum on the 1884 shares and £2 16s. upon the 1887 and 1899 shares was declared.

CLARK'S PATENT "SYPHON" STOVES

FOR USE WITHOUT A FLUE.

NEW POWERFUL HEATER.
No. 22 "SYPHONETTE."

No Smoke! No Smell! No Dirt or Trouble! No Danger!

Consumers appreciate an Economical Heating-Stove.

The "Syphon" System is the most economical for producing Heat. There is no Waste by Flue or Chimney. The Consumption of Gas is absolutely governed by the Regulator.

WRITE FOR NEW SEASON'S CATALOGUE.

S. CLARK & CO.,
"Syphon" Works, PARK ST., ISLINGTON, LONDON, N.

The Local Government Board and Public Lighting by Acetylene.—The "Local Government Journal" states that, in response to an application by a Parish Council for approval of a loan for the provision of the necessary plant for lighting the public lamps, the Local Government Board intimate that, in view of all the requirements necessary for safety in storing carbide of calcium, and the character and manipulation of the generating apparatus, they are not willing to approve of such proposals.

New York Water Supply.—In previous issues of the "JOURNAL" we have dealt with the report prepared by Mr John R. Freeman on the above subject; an article (*ante*, p. 108) giving his analysis of the various sources of waste and consumption, and the remedies proposed. His instructions were to "get together as much reliable information on New York's need for more water" as was possible in the time available; and the result was the presentation of a voluminous report, of which a full abstract has appeared in the "Engineering Record." Having noticed the first portions of this document, we now avail ourselves of our contemporary's assistance to briefly outline the problem which Mr. Freeman's studies have shown to confront the people of Greater New York. So far as the water supply questions are involved, two divisions of the city must be recognized. The boroughs of Manhattan and the Bronx (the old city of New York) form one of them; and the boroughs of Richmond, Brooklyn, and Queens, the other. Richmond includes Staten Island; and its available water supply, whether from the surface or from the ground, is so inadequate that it must look to Brooklyn for its future supply. There is no physical line of demarcation between the boroughs of Brooklyn and Queens, which occupy the western end of Long Island. It is, therefore, convenient to refer to the divisions New York and Brooklyn respectively, after the leading borough in each. With regard to New York, the situation revealed by the investigation is so simple that it can be stated in a sentence. The greatest supply of the present system of works upon which it is safe to rely is 290 million gallons per day; and at the existing rate of increase in consumption, even with extreme care and a moderate restriction of waste, the full capacity of the works will be taxed in five years. In Brooklyn, the average consumption is 92 million gallons, and about 10 million gallons more are drawn from private water companies. The city was on the verge of a water famine last year; and quite lately the Engineer of the water-works notified the authorities that the same condition is now imminent. In Richmond and Queens, a shortage of water has been chronic for some years. The situation of America's greatest city is, therefore, one which is fraught with the gravest dangers, which only those who have had to do without water for a time can appreciate. There are three remedies for this condition of affairs—the restriction of waste, the construction of municipal works, or the purchase of water from a private company; and these are dealt with in detail by our contemporary.

The Monte Video Water-Works Company announce the payment on the 1st prox. of an interim dividend at the rate of 5 per cent. per annum for the half year ending the 30th of June last.

The export of sulphate of ammonia from the United Kingdom to Germany decreased last year by 3593 tons.

The Gas and Water Committee of the Hull Corporation have decided to include in the next Bill to be promoted by them powers to establish and contribute to a superannuation fund for the employees.

In the year ending March 31 last, the fees paid into the House of Lords fund included a sum of £39,249 in respect of Private Bills. Of the total amount received, £37,916 was paid into the Exchequer.

In yesterday's "Times" will be found an able summary of the general legislation of the past session by the Editor of "Chitty's Statutes of Practical Utility." The Companies Act is dealt with at considerable length.

The Consolidated Petroleum Company, Limited, the capital of which is £500,000, have taken over, as from the 1st inst., the business in Russian petroleum and gas oil hitherto conducted by the Anglo-Caucasian Oil Company, Limited, and by certain firms acting on behalf of Messrs. Bessler, Waechter, and Co.

Inquiries sometimes reach us in regard to gas-engines of small power. One made by Messrs. A. E. & H. Robinson, of Manchester, is illustrated in the current number of the "Iron and Coal Trades Review." It works up to 1 brake horse power, and indicates 1½-horse power. The cylinder diameter is 3½ inches, and the weight about 3 cwt. The approximate dimensions are: Length, 2 ft. 9 in.; width, 1 ft. 7 in.; height, 2 ft. 3 in.

The Crawley Gas Company has been registered with a capital of £10,000, in £5 shares, to acquire the freehold gas-works and other property of a Company of the same name, and to carry on at Crawley, Sussex, the business of an electric light supply company. The first Directors (to number not less than three nor more than five) are Messrs. Henry Woodall, Alfred Kitt, and W. S. Surridge; their qualification being £300.

A very fine installation of incandescent gas lighting is now in operation at the San Paulo Railway Station; white mantles made by the Sunlight Company's patent artificial silk process being exclusively used. During the present year, these mantles have also been installed almost throughout Windsor Castle and Buckingham Palace; and we are informed that in all the above-named cases the quality of the light and the strength of the mantles are in every way satisfactory.

The Water Committee of the Leeds Corporation have had under consideration the necessity of obtaining increased provision for the supply of water to the city; and they intend asking the Council to apply to Parliament in the ensuing session for powers to enable them to carry out a scheme for the utilization for this purpose of the waters of the Burn, Skell, and Laver. This decision has led the Ripon Corporation to take measures for safeguarding their interests; and their first step has been to appoint a deputation to interview the Marquis of Ripon, the principal riparian owner. It is felt that within a short time, with the growth of the city, Ripon will want more water; and any extension of the present supply must be in the direction of the Laver. The Harrogate Corporation have also been considering the possibilities of a supply from the Burn.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily
BLACKBURN	1,250,000	WINNIPEG, MAN.	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	COLCHESTER (Second Contract)	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	YORK	750,000
COLCHESTER	300,000	ROCHESTER	500,000
BIRKENHEAD	2,250,000	KINGSTON, ONT.,	300,000
SWINDON (New Swindon Gas Co.)	120,000	CRYSTAL PALACE DISTRICT	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	DULUTH, MINN.	300,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000	CATERHAM	150,000
HALIFAX	1,000,000	LEICESTER	2,000,000
TORONTO	250,000	ENSCHEDE (HOLLAND)	150,000
OTTAWA	250,000	BUENOS AYRES (RIVER PLATE CO.)	700,000
LINDSAY (Remodelled)	125,000	BURNLEY	1,500,000
MONTREAL	500,000	KINGSTON-ON-THAMES	1,750,000
TORONTO (Second Contract; Remodelled)	2,000,000	ACCRINGTON	500,000
BELLEVILLE	250,000	TONBRIDGE	300,000
OTTAWA (Second Contract)	250,000	STRETFORD	500,000
BRANTFORD (Remodelled)	200,000	OLDBURY	300,000
ST. CATHERINES (Remodelled)	250,000	TODMORDEN	500,000
KINGSTON, PA..	125,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
PETERBOROUGH, ONT.	250,000	YORK (Second Contract)	750,000
WILKESBARRE, PA..	750,000	ROCHESTER (Second Contract)	500,000
ST. CATHERINES (Second Contract)	250,000	NEWPORT (MON.)	250,000
BUFFALO, N.Y..	2,000,000	TOKIO, JAPAN	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

ENRICH your Gas with cheap Benzol, Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE. Apply to SADLER AND CO., MIDDLESBROUGH.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

BY the adoption of Cripps's Bye-Pass VALVES inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see Oct. 2, p. 864.]

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.
MELROSE CYCLE COMPANY, COVENTRY.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Waggons or Carboys. Highest references and all particulars supplied on application.

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

GAS Operator, used to Humphreys and Glasgow Water-Gas Plant, seeks Situation. Two Years' Experience. Also capable of taking charge of Electric Light Plant for Purifying-Houses.
H.P., 65, Sydney Street, FULHAM ROAD, S.W.

GAS Manager's Son (age 18) desires a Situation on a Gas-Works, 3½ Years' Experience at Indicing, Collecting, Store Keeping, and generally assisting Manager. Very willing and persevering.
Address No. 3565, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Manager's Son seeks engagement where time would be mostly spent on Works and District. Conversant with Works, Office, and District routine. Accustomed to use Photometer daily and conduct the necessary Tests for Purity. Energetic, and holder of Guilds Honours Certificate. In present Situation over Two Years, acting as General Assistant to Manager, and taking charge in his absence. Wishes to increase Experience (particularly in construction) on Works supplying a growing Town. Abstainer. Excellent References.
Apply, by letter, to No. 3575, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER wanted for small Gas-Works in Kent. Wages 27s. for Seven Shifts.
Write MID KENT GAS COMPANY, SNODLAND.

WANTED, good Main and Service LAYERS.
Send Particulars of Qualifications, Experience, &c., and apply direct to the ENGINEER, Gas Department, George Street, NOTTINGHAM.

COMPETENT Agent wanted to represent a first-class German Manufacturer of Incandescent Gas-Burners.
Address, stating References, I. E. 2213, care of Rudolf Mosse, BERLIN, S.W.

WANTED, immediately, an experienced STOKER used to Shovel Charging, and Engine and Exhauster. Must be steady and reliable.
For Particulars, apply to H. C. SHEPHERD, Manager and Secretary, Gas-Works, Cricklade Road, SWINDON.

WANTED, at once, a good Gas-Works STOKER. Shovel Charging. Engine and Exhauster. Wages 30s. per week Winter Months, and 28s. Summer.
Apply to A. E. HOWARD, Manager, Gas-Works, Fazeley, near Tamworth, STAFFS.

WANTED, an Assistant Clerk for the Office of the Sligo Gas Company. Salary to commence at £50 per annum.
Applications, with Testimonials, not later than the 18th inst.

C. B. TULLY,
Secretary.

Sligo, Oct. 6, 1900.

SCUNTHORPE URBAN DISTRICT COUNCIL.

APPOINTMENT OF GAS-WORKS MANAGER.

THE Scunthorpe Urban District Council invite Applications for the Office of WORKS MANAGER of their new Gas-Works.
Applicants must thoroughly understand the Management of Gas-Works, and be able to read and fix Meters, and do any ordinary Fitters' Repairs on the Works, Mains, and Service-Pipes. The person appointed will be required to reside on the Works, and will have House, Gas, Coal, and Rates free.
The output will probably be about 9 million cubic feet to commence with; and it is expected to rapidly increase under proper management.
Applications, in Candidates' own Handwriting, stating Age, Experience, and Wages required, with not exceeding three Testimonials, must be sent to me, at my Office, Trafford Street, Scunthorpe, before Three p.m., on Tuesday, the 16th day of October, 1900, and should be marked on the cover "Gas-Works Manager."

By order of the Council,
FRANK C. HETT,
Clerk.

Scunthorpe, October, 1900.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application.
No. 30, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

WANTED, Three experienced Carboniz- ing FOREMEN, used to Inclined Retorts and Regenerative Settings.
Apply for further Particulars as to Wages and Duties, stating Age and References, to No. 3572, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a steady, reliable Man as STOKER. Must be a good Shovel Charger, and used to Engine and Exhauster. Wages, 35s. per week of seven days, with a week's holiday every year.
Apply to S. BARK, Manager, Gas-Works, SUNBURY-ON-THAMES.

WORKS Manager required in Engineer- ing Works. Must be steady and capable of turning work out cheaply and expeditiously. One used to Gas Plant preferred.
State, by letter, Age, Experience, and Salary expected, to No. 3574, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROTHERHAM CORPORATION.
(GAS DEPARTMENT.)

WANTED, a thoroughly capable Works FOREMAN. Experience of Inclined Retorts and raking Furnaces necessary. Wages £2 per week; Eight-Hour Shifts.
Apply, with Testimonials, to the undersigned not later than Oct. 23.

FRANK A. WINSTANLEY,
Engineer and Manager.

GAS-FITTERS REQUIRED BY
THE CITY OF BIRMINGHAM GAS DEPARTMENT.

APPLICATIONS for Employment will be received from fully-qualified GAS-FITTERS, accustomed to Meter Fixing, Carcase Work, and House Fitting, Iron and Compo.
Two recent Testimonials as to Character and Capacity will be required. State Age. Fitters start at 8d., rising to 8½d. per hour.
Apply to FITTINGS SUPERINTENDENT, Gas Offices, BIRMINGHAM.

RAUNDS GASLIGHT AND COKE COMPANY, LIMITED.

WANTED, a thoroughly competent and practical WORKING MANAGER, to take charge of the above Works on Oct. 18, 1900. Annual make of Gas about 5 millions. An Assistant to help in Stoking and other Work provided. Terms 28s. a week, with good House, Gas, and Fuel.
Apply (with Testimonials) on or before Friday, Oct. 12, 1900, to Mr. E. J. WHITNEY, Secretary, Gaslight and Coke Company, Raunds, NORTHAMPTONSHIRE.

"KING'S TREATISE ON COAL GAS."

ADVERTISER is desirous of purchasing a complete Set of the ABOVE WORK, and will be prepared to pay a fair price for a Perfect and Clean copy.
Address No. 3566, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO BE LET on Hire—
FACING MACHINE, for facing *in situ* Self-Sealing Retort Mouthpieces any shape or size, ○, Oval, or Circular.
PULSOMETER, Size No. 5, with 4-in. suction and 3-in. delivery. Steam-Pipe 2½ in. diameter. Discharge 10,000 Gallons per hour.
Write J. WRIGHT, Bridge House, BLACKFRIARS BRIDGE, E.C.

PURIFIERS FOR SALE.

THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive OFFERS for Four 12-feet square old PURIFIERS, with CENTRE-VALVE and 12-inch CONNECTIONS, LIFTING and TRAVELLING APPARATUS, and Two 12-inch RACK and PINION VALVES.
Also Two old PURIFIERS, 22 ft. by 8 ft., with 10-inch CONNECTIONS and Two Anderson 10-inch FOUR-WAY VALVES and Four 10-inch RACK and PINION VALVES and LIFTING APPARATUS.
The whole can be seen at the Company's Works in position, and to be pulled down and removed by the purchaser.

By order,
JOHN NIVEN,
Secretary and Manager.

Clayton, near Bradford,
Sept. 18, 1900.

FOR SALE—200 Street Lamp-Posts, with LANTERNS and FRAMES.
Apply to the GAS COMPANY, ST. ANNE'S-ON-THE-SEA.

GASHOLDER wanted, 20 to 25 feet diameter; also PURIFIER, 9 feet square, and LIVESEY WASHER for ¾ million per day.
ALFRED WILSON, DOXEY, STAFFORD.

"CUTLER'S" Condenser, ¾ million day, equal to new; weight 12 tons; accept £100 on rail, Berkshire, if sold promptly.
J. F. BLAKELEY, Thornhill, DEWSBURY.

FOR SALE—One Second-hand 40,000 cubic feet per hour "ANDERSON" ENGINE and EXHAUSTER, in good condition.
Apply to F. P. TARRATT, Gas-Works, DARLINGTON.

FOR SALE—Nine old Cast-Iron GASHOLDER COLUMNS.
For Particulars, apply to W. J. DOUGALL, Engineer and Manager, Gas-Works, SEVENOAKS.

FOR SALE, Cheap—One, Two, or Three PURIFIERS, 8 ft. square by 4 ft. deep, in good condition, with Valves, Connections, and Lifting Gear.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

HIGH-PRICED COAL.

SMALL Gas-Works Authorities should immediately adopt an EXHAUSTER, and thus make probably at least 750 cubic feet of gas more from each ton of Coal carbonized. Several small sets *in stock*, both New and Second-hand.
Address J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

J FIRTH BLAKELEY & CO., Thornhill, Dewsbury, have FOR SALE:—
One Set of Three 6-ft. PURIFIERS.
One " Two 8-ft. "
One " Four 8-ft. "
One " Four 16-ft. by 12-ft. PURIFIERS.
Four 5-inch ANNULAR CONDENSERS.
Four 10-inch " "
Six 16-inch " "
"Cutler" ¾ million WATER" CONDENSER.
Wrought-Iron TOWER SCRUBBERS, 3 ft. by 14 ft., 3 ft. 6 in. by 27 ft., and 7 ft. by 32 ft.
Cast-Iron TOWER SCRUBBERS, 3 ft. 6 in., 5 ft., and 6 ft. diameter.
EXHAUSTERS, 2000 to 60,000 Cubic Feet per hour.
"Holmes" & "Clapham" WASHER-SCRUBBERS.
"Livesey" & "Cripps" WASHERS.
4-in., 6-in., 8-in., and 10-in. STATION METERS.
Splendid GASHOLDER, 50 ft. by 20 ft.
RETORT IRONWORK, MODERN HYDRAULICS.
Telegrams: "BLAKELEY, THORNHILL LEES."

COUNTY BOROUGH OF BURY.

THE Gas Committee invite Tenders for the supply and erection of a set of WATER-COOLED CONDENSERS, capable of condensing 2 Million Cubic Feet of Gas in the Twenty-four Hours.
Further Particulars may be had upon application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Elton, Bury.
Sealed Tenders, endorsed "Condensers," to be delivered to the undersigned, not later than Tuesday, the 16th of October, 1900.

JOHN HASLAM,
Town Clerk.

Corporation Offices,
Bank Street, Bury.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of FIRE-BRICKS, RETORTS, &c., for their Albion Street Works.
Full Particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Fire-Clay Goods," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m., on Thursday, the 18th of October, 1900.

L. C. EVANS,
Town Clerk.

Town Hall, Salford,
Oct. 5, 1900.

BOROUGH OF CHORLEY.

THE Corporation invite Tenders for the following:—
(1) Purchase of surplus TAR produced at their Gas-Works for Twelve Months from the 1st of November next.
(2) Supply of LUMP LIME or LIME CHIPPINGS, 150 Tons.
(3) Supply of VITRIOL, 100 to 120 Tons.
(4) Supply of CAST-IRON PIPES, 2-in. to 20-in., and SERVICE-PIPES.
} For Twelve Months from the 1st of November next.

Forms of Tender and any other Information may be obtained on application to Mr. John M'Cubbin, Gas Manager.
Tenders, duly endorsed, to be sent to me on or before Tuesday, the 16th of October, 1900.
The Corporation do not bind themselves to accept any Tender.

By order,
JNO. MILLS,
Town Clerk.

BOROUGH OF KENDAL.
(GAS DEPARTMENT.)

GASHOLDER AND STEEL TANK.

THE Gas, Water, and Electricity Com- mittee of the above Corporation are prepared to receive TENDERS for the construction of a STEEL GASHOLDER TANK, 90 feet diameter by 25 feet deep; also of a TELESCOPIC GASHOLDER, Inlet and Outlet Pipes, and Appurtenances, to be erected at the Gas-Works, Kendal.
Copies of the Specification, Bill of Quantities, and Form of Tender may be obtained, and Plans seen, at the Office of Mr. T. N. Ritson, Assoc.M.Inst.C.E., Engineer and Manager, Gas-Works, Kendal, on payment of Three Guineas, which will be returned on receipt of a *bond-fide* Tender.
The Committee reserve the right to modify the above-mentioned Specification and Plans, so as to enable Makers of Patent Cable and Spiral-Guided Gasholders and other persons wishing to avail themselves of Patent or other rights or facilities to tender in accordance with the Contractor's own Designs. Such alternative Designs, with complete Plans and Specifications, to be submitted to the Engineer, and approved by him before the Tenders are made.
Sealed Tenders, endorsed "Tank and Holder, Contract No. 2," to be delivered to the undersigned not later than Twelve o'clock noon on Wednesday, Oct. 31, 1900.
The Committee do not bind themselves to accept the lowest or any Tender.

(Signed) JOHN BOLTON,
Town Clerk.

Kent Street, Kendal,
September, 1900.

THE GASLIGHT AND COKE COMPANY.

SALE BY TENDER
OF
£125,000 ORDINARY STOCK,
AND OF A SUM NOT EXCEEDING
£100,000 THREE PER CENT. CONSOLIDATED DEBENTURE STOCK.

THE Directors of this Company will be prepared to receive, not later than Wednesday, the 24th inst., TENDERS for the above-named STOCKS of the Company, in amounts of £5, or multiples thereof. Such Stocks are to be paid up in full as follows—viz.,
Ordinary Stock, the 15th of November, 1900,
Debenture Stock, the 1st of December, 1900,
and will be registered in the Company's Books free of Expense.
The Minimum Prices below which no Tenders will be accepted are as follows—viz.,
Ordinary Stock, £100 per Cent.,
Debenture Stock, £94 per Cent.
Forms of Tender, with full Particulars and Conditions, may be obtained on application at this Office.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., Oct. 2, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

500 £10 "E" SHARES.

250 being Seven per Cent. Ordinary Shares, and 250 Five per Cent. Preference Shares.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 23, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £5000 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 23, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 250 £10 "C" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 23, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
NEW SWINDON GAS COMPANY.

£3719 NEW ORDINARY FIVE PER CENT. STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 23, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LEA BRIDGE DISTRICT GAS COMPANY.

ISSUE OF £10,000 FIVE PER CENT. PREFERENCE STOCK, at a Minimum Price of £120 per £100, and £10,000 CONSOLIDATED ORDINARY STOCK, at a Minimum Price of £117 per £100.

THE Directors of the Lea Bridge District Gas Company hereby invite TENDERS for
£10,000 FIVE PER CENT. PREFERENCE STOCK,
AND
£10,000 CONSOLIDATED ORDINARY STOCK,
on which the last Dividend was at the rate of Six per Cent. per annum.
Full Particulars, Conditions, and Forms of Tender may be obtained on application to the SECRETARY, at the Company's Offices, 146, 147, and 148, Dashwood House, New Broad Street, LONDON, E.C.

By order of the Directors of the
SOUTHAMPTON GASLIGHT AND COKE COMPANY.

NOTICE OF SALE OF
£4630 FIVE PER CENT. ORDINARY STOCK
IN THE
SOUTHAMPTON GASLIGHT & COKE COMPANY,
IN LOTS OF £100.

BANCE, HUNT, & CO. are favoured with Instructions from the Directors of the Southampton Gaslight and Coke Company to SELL BY AUCTION, at the Company's Offices, Ogle Road, Southamptan, on Friday, Oct. 12, 1900, at 2.30 for 3 p.m. precisely.
Further Particulars and Conditions of Sale may be obtained of the SECRETARY Southampton Gaslight and Coke Company, Ogle Road, or the AUCTIONEERS, 67, Above Bar, SOUTHAMPTON.

Now Ready. Price 6s.

LAW
OF
LONDON GAS COMPANIES
BY
T. J. BARNES,
OF THE MIDDLE TEMPLE *Barrister-at-Law.*

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HOLMSIDE
GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 7/10 Stand. Sperm Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

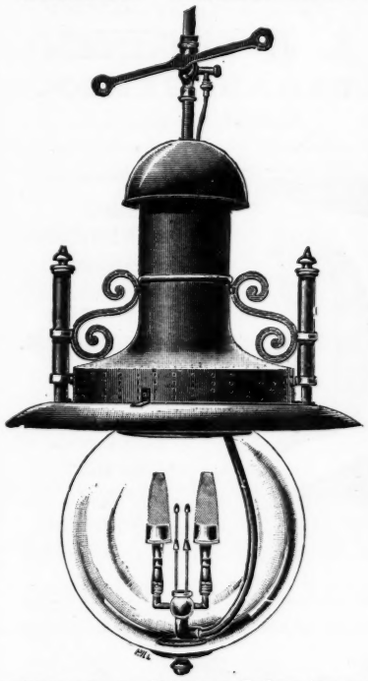
Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THE PATENT

"BEACON" GLOBE LAMP.



As fitted at London Bridge near Railway Approach, three Lamps giving the Illuminating Power of 600 Candles. See Surveyor's Report as published in the "*JOURNAL*" for Jan. 10, 1899.

H. GREENE & SONS, Ld.,

Late of Cannon Street,

19, Farringdon Road, E.C.

elegrams: "LUMINOSITY, LONDON."

NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

GAS-FITTINGS.

BURNERS

Welsbach Pattern

per **7/6** Doz.

WRITE FOR CATALOGUE.

WHOLESALE FITTINGS COMPANY

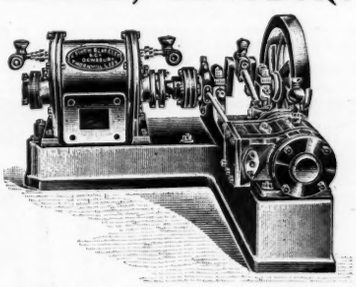
80, Commercial Road, London, E.

INCANDESCENT.

J. Firth Blakeley & Co.,

Gas Engineers,

Thornhill, DEWSBURY.



The **High Prices of Coal** should induce Small Gas-Works Authorities to adopt an Exhauster, and thus effect a large saving in Coal.

Probably at least 750 cubic feet more Gas being made from each Ton of Coal Carbonized.

Several Sets of EXHAUSTING PLANT in Stock, both New and Second-hand.

Particulars sent on application.

Thorough Efficiency Guaranteed.

Exhausters, any capacity.

NEW GAS PLANT OF ALL KINDS. RETORT WORK, CONDENSERS, WASHERS, SCRUBBERS, PURIFIERS, METERS, GOVERNORS, GASHOLDERS, VALVES, &c., IN STOCK OR PROGRESS.

Photos. sent. Inspection invited.

Telegrams: "BLAKELEY, THORNHILL LEES."

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

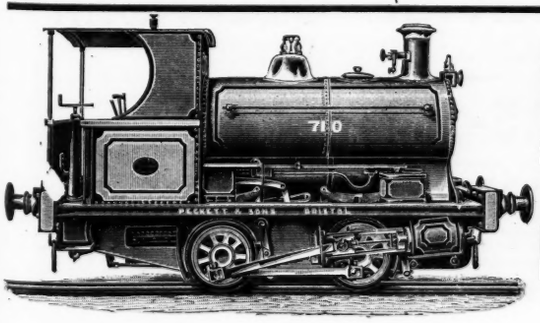
THOS. W. DANCE, SON, & HUNTER,

COAL OWNERS, NEWCASTLE-ON-TYNE

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.



LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c Locomotives of various Sizes always in Stock, ready for Immediate Delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, Atlas Locomotive Works, BRISTOL.

Telegraphic Address: "PECKETT BRISTOL."

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.

Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

HARDMAN & HOLDEN, LD.
ESTABLISHED 1820.

SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER.

Inquiries Solicited.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL CO., LD.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL CO., LD.
QUAYSIDE, NEWCASTLE-ON-TYNE.

WELDON MUD
FOR
GAS PURIFICATION.
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED. —
1, FENCHURCH AVENUE, LONDON, E.C.

BOLDON GAS COALS.

Yield of Gas per Ton. .	10,500 Cubic Feet.
Illuminating Power . .	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

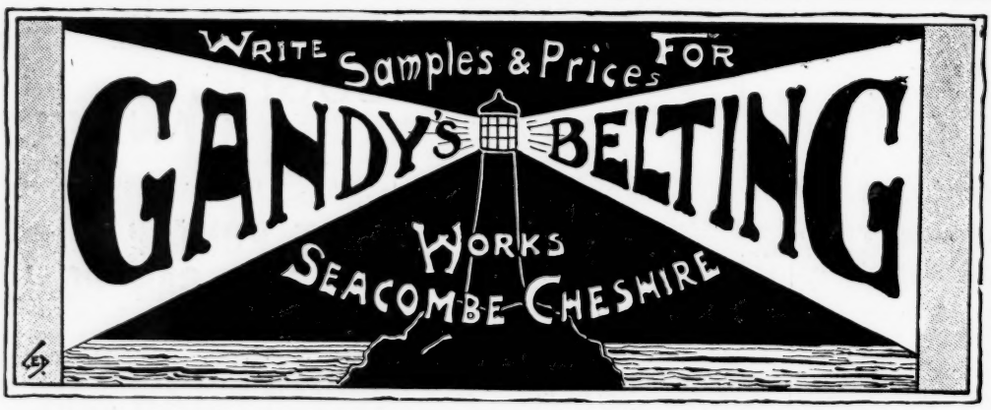
For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

LONDONDERRY GAS COALS
FROM THE
LONDONDERRY COLLIERIES,
COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR,
COUNTY OF DURHAM.



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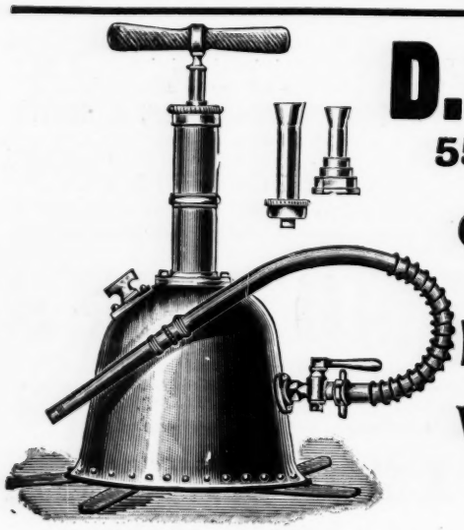
Sole Agents for
"DODGE"
Standard
Wood Split
PULLEYS.

AS USED BY THE LEADING GAS AND WATER COMPANIES.



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55 & 56, High Holborn, London.

GAS SERVICE CLEANSERS.
LAMP TORCHES.
DRY GAS-METER MAKERS.
WROUGHT-IRON TUBES & FITTINGS.
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PRICE LISTS ON APPLICATION.

THE

DENAYROUZE LIGHT SYNDICATE, LTD.

28, VICTORIA STREET, WESTMINSTER, S.W.

The Pioneers of Incandescent Burners without Chimneys.

THE "SMALL TORCH" Burner (Bandsept Patent) for Street Lighting, consuming **3½** feet of Gas per Hour, having an efficiency of **25-Candle Power per Cubic Foot of Gas** consumed at ordinary pressure, is not only the **BEST** but **CHEAPEST** intensive **CHIMNEYLESS** Burner on the Market.

PRICE COMPLETE WITH MANTLE

4s. 9d.

All other Burners supplied by the Syndicate proportionately reduced, full Particulars of which will shortly be issued to the Trade, and followed by new and complete Catalogue.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

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MOBBERLEY & PERRY STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES; BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

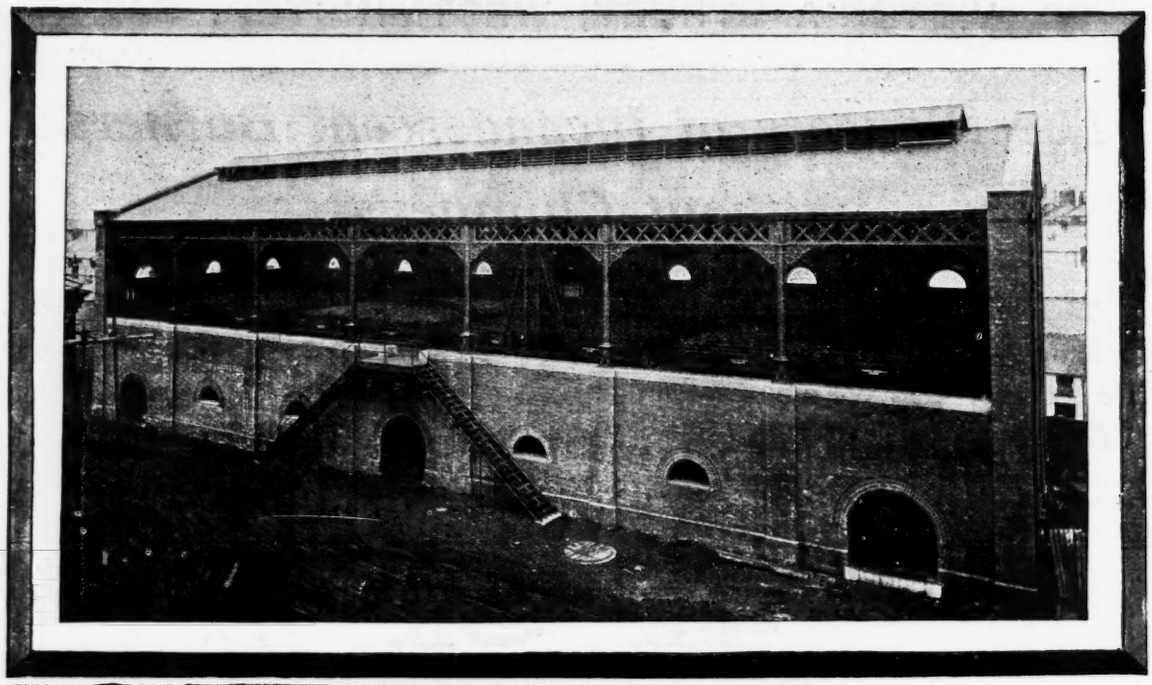
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

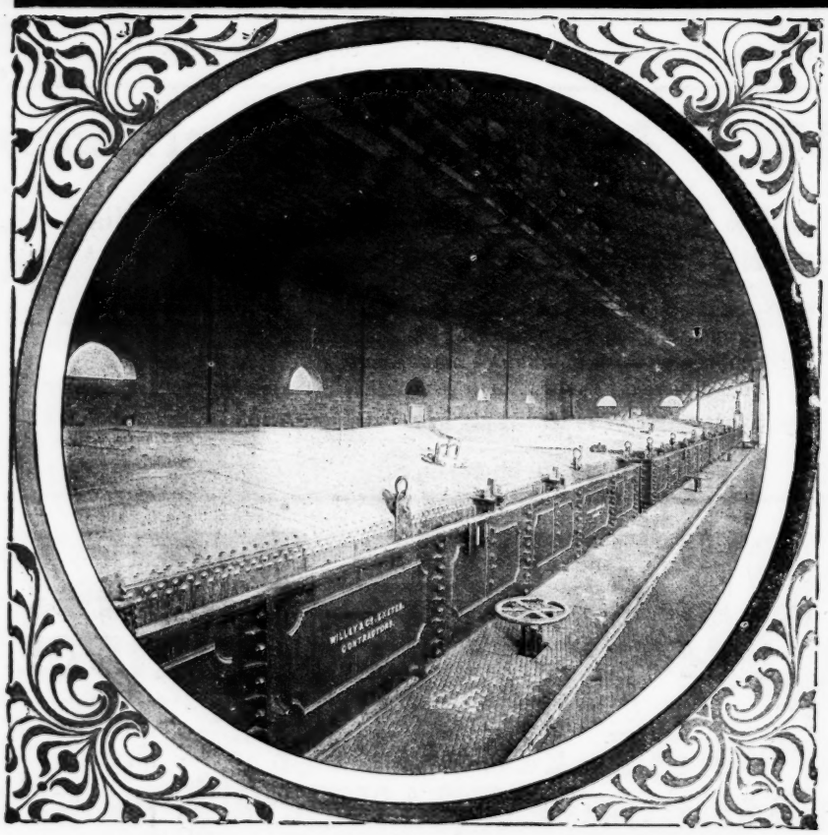
London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

WILLEY & CO.,

ENGINEERS, IRONFOUNDERS, & CONTRACTORS.





New 30 feet Square

Overhead

Purifiers

WITH STAGING, ROOF, 24-IN. VALVES & CONNECTIONS, &C., COMPLETE.

Recently CONSTRUCTED and ERECTED for the

Swansea Gas Co.

To the Design of
THORNTON ANDREWS, Esq., C.E.

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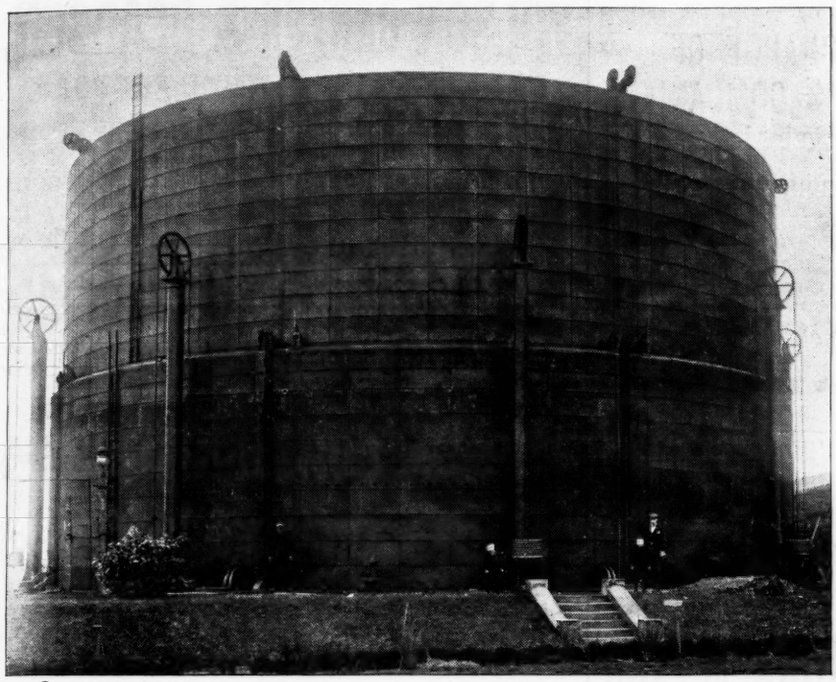
Telegrams: "WILLEY, EXETER."
Telephone: 132 and 263.

METER-WORKS—32a, Hertford Road, De Beauvoir Town, LONDON, N.; and James Street, EXETER.
OFFICES & DEPOTS—LONDON: 18, Adam Street, Adelphi; MANCHESTER: Victoria Buildings.
PLYMOUTH, DEVONPORT, SWANSEA, & NEWPORT.



INNER LIFT ADDED TO A SINGLE-LIFT GASHOLDER,

80 ft. diameter by 24 ft. deep. Both Lifts Cable-Guided. Counterbalance to Outer Lift on old Columns.

KIRKCALDY GASLIGHT COMPANY.

(*From a Photo.*)

PATENTEES AND MANUFACTURERS:—

ASHMORE, BENSON, PEASE, & CO., LTD.,

STOCKTON-ON-TEES.

ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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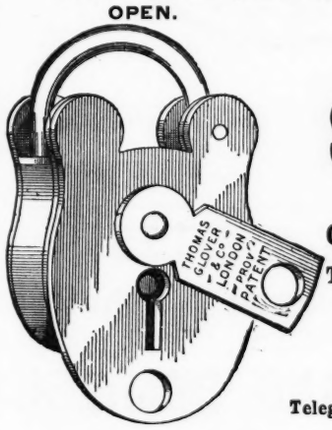

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PATENT

SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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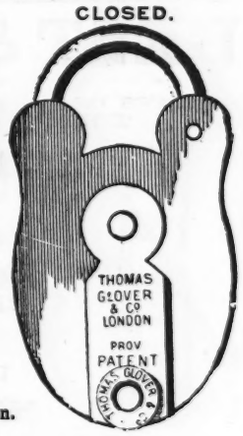


Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1066.

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address:* "GOTHIC."

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 2026.

GLASGOW: 69-71, McALPINE STREET. *Telegraphic Address:* "GASMAIN." Telephone No. 6107.

Price 6s., Post Free.

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES:

A History of the Question of Price in London from the Introduction of Gas Lighting to the Present Time.

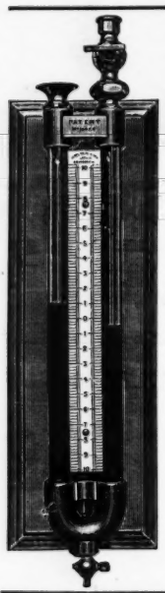
By LAURENCE W. S. ROSTRON, M.A., B.C.L,
Of New College, Oxford, and Lincoln's Inn, Barrister-at-Law.
With a Preface by
GEORGE LIVESEY, M.Inst.C.E.

LONDON: WALTER KING, 11, BOLT COURT, FLEET ST., E.C.

STEEL SCOOPS
FOR
RETORT CHARGING.

Scoops supplied with or without handles, and of any dimensions or shape required.

HENRY SYKES, Ltd., Engineers,
66, BANKSIDE, LONDON, S.E.



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LIMITED
GAS ENGINEERS
MILTON HOUSE WORKS
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BEST & LLOYD
MAKERS OF THE
Limited,
BIRMINGHAM.

PATENT "SURPRISE" PENDANT,
WITH PATENT SHADE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

Extract from the JOURNAL OF GAS LIGHTING, Jan. 8, 1895.
"IN CONJUNCTION WITH
THE INCANDESCENT GAS-LIGHT
it quite **supersedes** the familiar three-light pendant. We are able to bear witness to the **convenience** of the New Pendant."

WILSON CARTER & PEARSON,
GAS COAL AND CANNEL FACTORS,
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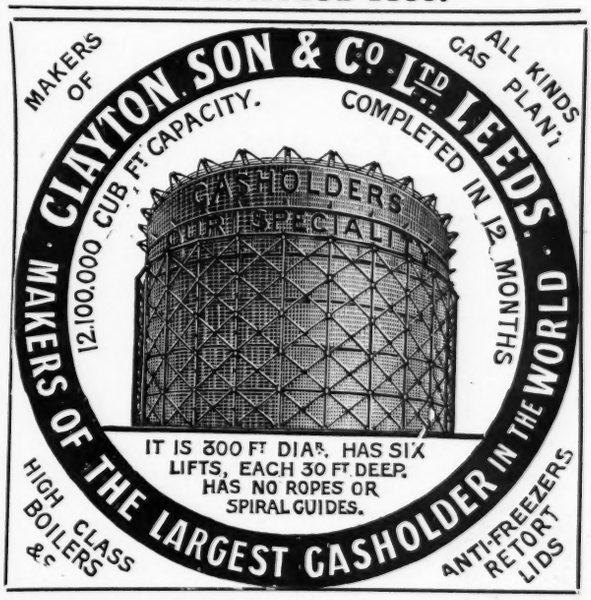
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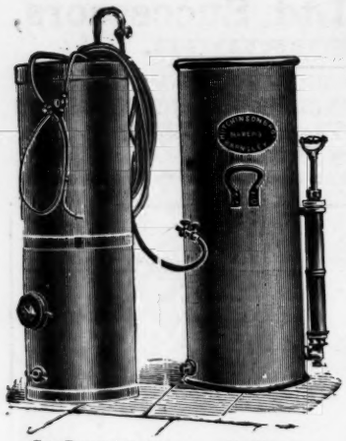

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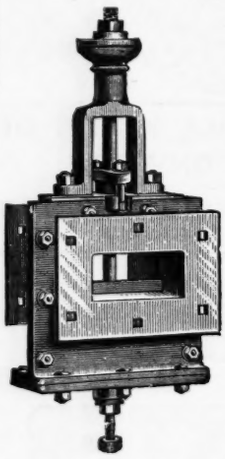

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